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Portable Pens Compared with Other Enclosures for Control of Diseases of Dairy Calves

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White Blood Cell Count in Hog Cholera

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(Complete Index on Page VIII)

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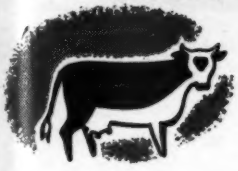

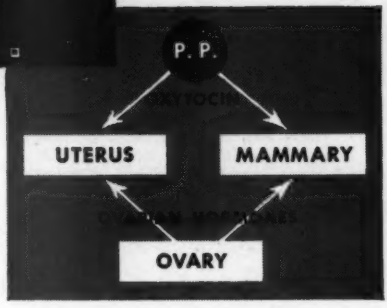

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In This Issue . . .

General Practice . . .

Portable Pens Compared with Other Enclosures for Control of Diseases of Dairy Calves—L. R. Davis, G. W. Bowman, and D. A. Porter 485
Influence of Protein on the Milk Fever Complex: A Four Year Study. Part II, Ketosis (Acetonemia)—R. F. Vigue 491
White Blood Cell Count in Hog Cholera—William L. Sippel 497
Rabies in Cattle. I. Prevention of Vampire Bat Paralytic Rabies, Derriengue, by Vaccination with Chick-embryo-adapted Rabies Virus—C. R. Schroeder, Jack Black, R. L. Burkhart, and Hilary Koprowski 502
A New General Purpose Lubricant—Horace T. Barron and George R. Burch 507

Small Animal Practice . . .

Reduction of Fractures of the Distal End of the Femur—Raymond J. Garbutt 509
Studies of Newcastle Disease and Canine Distemper Virus in Puppies—Reginald L. Reagan and A. L. Brueckner 513

Editorial Comments . . .

Permit Required to Import or Transport Interstate Restricted Animal Disease Organisms and Vectors 501
XVth International Veterinary Congress—Stockholm 514
Veterinary Headlines During 1952 Suggest the Need for More Disease Control Information 515
Propose Legislation to Regulate Garbage Feeding 517
Scrapie, a New Disease in the United States, Diagnosed in California Sheep 518
Vesicular Stomatitis 518
New Facilities at Michigan Now Occupied 519
Nobel Prize to American Antibiotic Researcher 519
Fast Action on the Coursing Field XXI
Moldy Corn Poisoning in Swine XXVI
Study Course in Veterinary Mycology XXVI
Principles of Animal Health—R. R. Dykstra 520
Poultry Practice Problems—W. R. Hinshaw 521

Abstracts of Literature . . .

Carbohydrate Metabolism and the Stress Diseases 522
Therapeutic Agents Against *Fasciola hepatica* 522
Hormone Influence on Growth and Carcass Quality of Lambs 522
Rats Can Transmit Brucellosis to Cattle 522

Clinical Reports . . .

Equine Lymphangitis: A Case Report—E. R. Hinshaw 523
Successful Treatment of Dermatoses in Small Animals—Bernard S. Klausman 524
Tuberculosis in a Young Dachshund—Allen B. Shopmaker and Edwin E. Epstein 525
Index for Volume 47, 1952 527
Keep Those Receipts—Harold J. Ashe XXXI
Coming Meetings XXXVIII
Necrology XLI

Portable Pens Compared With Other Enclosures For Control Of Diseases Of Dairy Calves†

LEONARD REID DAVIS, Ph.D., GEORGE W. BOWMAN, and DALE A. PORTER, Sc.D., Auburn, Alabama

FROM 1938, when this laboratory began to function, until 1943, it was found difficult to raise calves free of worm parasites, especially Strongyloides. None could be raised under practical management free of coccidia. Research work on the life histories of coccidia and worm parasites was hampered because of deaths of calves from concurrent infections of pneumonia and white scours. It was necessary to attempt improvements of calf management methods in order to continue research studies satisfactorily. This report is a summary of results obtained while using five different types of calf enclosures for disease and parasite control.

Materials and Methods

Since February 1943, a modified isolation method has been used at this laboratory for raising most of the calves used in investigations of bovine coccidiosis[1-5]. This method, referred to as the portable pen system, has been very satisfactory in controlling accidental clinical coccidiosis as well as preventing the transmission of pneumonia, paratuberculosis, parasitism, and white scours to other calves. The earliest portable pen was made of four wooden panels, each 3 ft. high by 10 ft. long. No flooring was used. Originally, during cold weather, a 3 x 5 ft. enclosed "dog house" shelter, with a raised wire mesh floor, was used in lieu of one of the four wooden panels. The pen was later modified by reducing it to 5 x 10 ft. Two x 4 in. welded wire-mesh was used to strengthen and decrease the weight of the pen, and to prevent the calf from sticking its head through the openings in the side panels.

The separate shelter was discontinued in 1947. Since then, half of the pen has been covered by a roof made of light-weight metal, which remains on the pen all of the time. During the winter, the pen was enclosed on one end and part of the sides, by using asphalt roofing material, cloth, or wooden panels as shown in the illustration (fig. 1). The calf was fed with a nipple pail and a combination feed box and hay rack. The feeder and a water pail were hung from a side panel high enough to prevent soiling by the calf. Sides of the portable pens were never scrubbed, even when a calf was removed and replaced by a younger one. Care was taken to be sure that the pen was moved to a fresh site before adding a new calf.

Ten or 12 pens were placed in a row at the bottom of an uncontaminated, wooded hillside, and moved sideways or uphill to a fresh site once each week, so that contamination could be washed downward by rains[2]. Pens were moved each week in order to reduce the number of oocysts ingested, and to get calves away from their own contamination before too many of the oocysts could become infective by the process of sporulation. Before the crest was reached, pens were moved to the bottom of the hill on the opposite side. Contaminated sites were not used again until they were rested for six to 12 months. A study of natural contamination by coccidia in 20 calves in the pens has been reported[4].

†From the Regional Animal Disease Research Laboratory, Bureau of Animal Industry, Agricultural Research Administration, U. S. Department of Agriculture, Auburn.

In addition to 12 portable pens, the following types of calf enclosures were used:

1. Six well-drained, individual stalls in a dairy barn, with individual concrete floor space 4 x 8 ft., and solid wooden partitions. These pens were scrubbed with soap or lye and water every day (fig. 2).

2. Two individual, 4 x 5 ft. pens with raised slat floors in a maternity pen in the dairy barn (fig. 3). The slat floor was cleaned and changed once each week. Galvanized wire mesh bottoms recommended by Bartlett and Tucker[4] were unavailable at the time. These pens were substituted in 1947 for the individual stalls.

3. A small barn and lot (pen 11) contaminated by older calves and yearlings in a planned absence of sanitation[5]. Barn was 14½ x 19½ ft. in size, with a well-drained concrete floor. The lot was 70 x 140 ft. (fig. 4).

4. Four outdoor, raised pens of concrete and hollow tile construction which were scrubbed every day. Pens were divided into two sides by a partition. Each side measured 8 x 16 ft. and consisted of a room and an uncovered runway, each of which was 8 x 8 ft. in size (fig. 5).

In 1943, most calves were protected from contamination during the first four to six weeks of life by using muzzles in an attempt to prevent ingestion of oocysts other than those given in life history studies[1]. Udall[6] had recommended the use of wire mesh muzzles to control ingestion of foreign material. The writers tried to eliminate all accidental ingestion of oocysts by making the muzzles of tin with an enclosed filter of glass wool in the end. Each muzzle was replaced every day with an autoclaved one. Tin muzzles were useful in life history studies, but proved unsuitable as a practical method for raising calves. The calves were stunted, and out of 92 calves studied in 1943, 23 (25%) died before two weeks of age, 33 (35%) died after two weeks, with a total of 56 (60.87%) deaths. Twenty-four of these had pneumonia. Because so many calves exhibited respiratory disturbances, the results obtained in 1943 are not included in this report, as it is believed that such abnormal environmental conditions would not be dupli-

Photographs by Leonard Reid Davis

Fig. 1. Portable calf pen in use at the Regional Animal Disease Research Laboratory. Three wooden panels have been added at the far end for winter use. Losses from all causes were 8.88%.

cated except by those studying the life histories of parasites.

During the interval between January 1, 1941 and December 31, 1950, excluding 1943, 340 calves were compared in this report. Seventy-three additional calves were not included, as they were killed to obtain tissues for experimental studies. Calves were mostly male grade Jerseys purchased locally and brought to the laboratory shortly after they were born. The

Fig. 2. Calf stalls in the dairy barn. Losses were 52.63%.

majority were obtained within 24 hours after birth. A few were born at the laboratory. No colostrum was given after the animals were purchased. All calves which lived long enough were inoculated one or more times with large numbers of infective oocysts of coccidia, or were exposed to natural contaminations by placing them in a barn and lot (pen 11) with older animals to simulate the usual dairy calf environment. All calves which survived, and those which died from coccidiosis or other infections, or were killed while moribund, are included in this report. Daily fecal examinations, beginning at eight to 14 days of age, were made to determine numbers and species of coccidia and other internal parasites. The survivors were retained until they were four to six months of age and were then used in other work where further regular examinations were recorded.

During the first two years covered by this report, some young calves were not brought to autopsy because they had not lived long enough to be included in the experiments on coccidiosis, and it was not known at the time that a later comparison would be made to show losses in various calf enclosures. No bacteriological examinations were made. Pneumonia was not listed as one of the causes of death unless macroscopic lesions were actually found in the lungs.

Results

There were 87 deaths (25.59%) in the group of 340 calves. Nineteen (5.59%) died before two weeks of age, and 68 (20%) died after two weeks. Of the 87 that died, 36 (41.38%) showed macroscopic lesions as evidence of pneumonia in their lungs. Two hundred and fifty-three (74.41%) of the calves survived. Up to 12 months of age there were no further losses except from experiments conducted on other projects.

The comparisons of mortalities in the five types of calf enclosures are shown in table 1. In table 1, losses are divided to show those below the age of 14 days and those in older calves. As some of the deaths resulted from concurrent infections with coccidia, pneumonia, or white scours; some calves were listed in two or three columns.

There were fewer deaths in the slat-floored pens, but only two pens were in use at a time. Removing the slat floor for cleaning each week and replacing it with a cleaned one which had dried for one week, required more time and effort than moving a portable pen a distance of about seven feet every seven days. Portable pens were second best from the

Fig. 3. Individual calf pen with raised slat floor. Two are shown in a maternity stall in the dairy barn. Doors of slat pen and maternity stall were opened for making the photograph. Losses were 7.14%.

standpoint of death losses, but calves raised outdoors in them appeared to be in better general health than those raised in all other enclosures. In addition to the data on pneumonia in the table, calves surviving in the portable pens manifested less evidence of respiratory troubles than did those in each of the other enclosures.

Portable pens did not prevent all contamination by coccidial oocysts, but the naturally

acquired infections were light*. At the ages of four to six months, when the calves were removed to pastures with others of similar ages, none developed clinical coccidiosis.

In studying the above comparisons, one should keep in mind that most of the calves were deliberately exposed to artificial or natural infections with far greater numbers of infective oocysts than would normally be encountered on a farm. Under ideal farm conditions where animals are protected as much as possible, comparative losses should not be as great as those reported for each of the five types of calf enclosure.

Helminth Parasites

Calves which were obtained within two days after birth were maintained free of worm parasites, except *Strongyloides papillosus*, when placed in concrete isolation pens and in barn stalls. Very light infections with Strongyloides were found in calves in all of the different types of enclosures. Some were discovered as early as the first examinations, when the calves were eight to ten days of age. For example, in the interval between 1945 and 1951, 46 (28.75%) out of 160 animals in the portable pens were found to pass Strongyloides eggs and nine (64.29%) of 14 showed these eggs while in the slat-floored pens.

One of the calves in the two slat-bottomed pens became infected with Cooperia sp. and *S. papillosus* during the time that two infected yearlings were kept in stanchions about ten feet away. The concrete floor beneath the yearlings was scrubbed daily with a strong stream of water from a hose, and it is possible that the slat pen was splashed with contaminated feces.

All of the calves which survived in the barn and lot with older calves became infected and passed relatively large numbers of eggs of either Cooperia, Trichuris, Haemonchus, Ostertagia, and Strongyloides, or combinations of these genera.

No worm infections other than Strongyloides were diagnosed in animals kept in portable pens, until May 1947, when a light infection with Cooperia sp. was found in one calf. It had been acquired at four days of age on a farm where serious trouble had been experienced with worm parasites. Except for Strongyloides and the one case of Cooperia sp., the grounds on both sides of the wooded hill where the portable pens were located, were kept free of worm parasites for 5½ years until the spring of 1948. In that year, four calves three days of age or older, were brought in from nearby farms. At the same time, the row of pens was inadvertently placed too low on the southern slope, and one end of each pen rested on the edge of a shallow ditch which received some drainage from the main dairy barn.

Despite these and other possible sources of

TABLE 1. A Comparison of Mortalities in Five Types of Calf Enclosures During a Ten-year Period at the U. S. Regional Animal Disease Research Laboratory, Auburn, Ala.

Enclosures	No. of Calves	Deaths	%	Causes of Deaths† Exper. Coccidiosis	Pneumonia	White Scours	Other Digestive Troubles	Lungs not Recorded	Not Determined	Age at Death (Days)
Barn stalls (fig. 2)	19	6*		—	—	3	—	3	3	5.83
		4**		3	1	1(21 da.)	—	3	1	60.00
		10	52.63							
Slat floors (fig. 3)	14	1*		—	—	1	—	1	—	9
		0**		—	—	—	—	—	—	—
		1	7.14							
Barn and lot with older cattle (fig. 4)	69	1*		—	—	1	—	1	—	7.4
		38**		32	25	—	3	6	1	64.74
		39	56.52							
Concrete isolation pen (fig. 5)	24	8*		2	4	5	—	4	—	9.12
		10**		10	3	—	1	5	—	51.82
		18	75.0							
Portable pens (fig. 1)	214	3*		—	—	1	—	2	2	8.33
		16**		12	3	1(16 da.)	—	8	2	73.59
		19	8.88							

†Some calves with concurrent infections are listed in more than one column.
*Under two weeks of age.
**Over two weeks of age.

contaminations, only in 27 (37.5%) of the 72 calves in the portable pens could eggs of genera previously mentioned, other than Strongyloides, be demonstrated during the next three years. In every case, the number of eggs was low and none of the animals revealed clinical symptoms of worm parasitism. None of the calves passing eggs was transferred to the northern slope, and as of this date (January 1952) that side of the hill is still free of worm-parasite contamination, except for Strongyloides in an occasional calf. Of the 27 calves in the portable pens that were infected, 13 were not purchased until they were more than two days old. Four of these were obtained at four days, one at six, and one at 14 days. More species of worms and more eggs of each species were demonstrated in older calves than in the 14 which were brought to the laboratory when one day of age. Fourteen of the 27 were found to be infected only with Trichuris, and eight of these passed eggs for only four days or less. Six of the 14 calves were not obtained until more than two days of age.

Infections with lungworm (*Dictyocaulus viviparus*) have not been seen in calves in

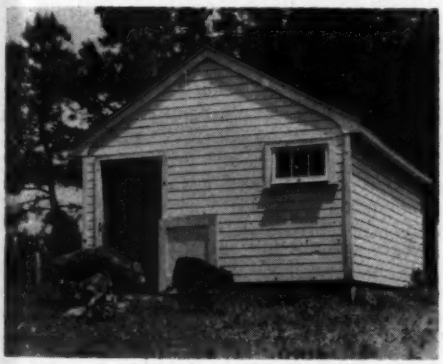

Fig. 4. Pen 11, where young calves were exposed to contamination from older animals in a barn 14½ x 19½ ft., and a lot which was 70 x 140 ft. The photograph was made from inside the lot. Losses were 56.52%.

the portable pens, and only one calf passed eggs of hookworm (*Bunostomum phlebotomum*), even though some of the animals came from farms where these parasites were present.

Practical Application

The extension dairyman of the Alabama Extension Service has informed the writers that the annual reports of the Alabama county agents show an increasingly widespread adoption of the portable pens[7]. He first brought the pens to the attention of Alabama dairymen in 1949. At the end of that year, there were 314 pens in use on 81 dairy farms in 21 of the 67 Alabama counties. In 1950 there were 1,009 pens on 251 farms in 33 counties. The 1951 reports indicate 1,283 pens on 322 farms

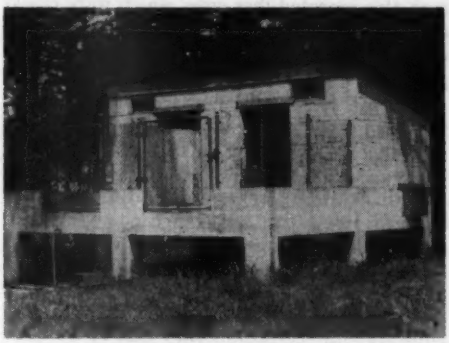

Fig. 5. Raised pen of concrete and hollow tile construction. Losses in four of these pens were 75%.

in 35 counties. Alabama county agents reported that 2,708 calves were raised in portable pens in 1951.

A typical report from a 100-cow, commercial dairy near Auburn, Ala., indicated previous losses from all causes of approximately 70% of all heifer calves while using stalls in a barn. On January 1, 1952, this dairy had 80 females, ten months of age or over, which were raised since the portable pens were first used in September, 1949. During this time no calves were lost from disease. The only fatalities have been three animals which choked to death as a result of forcing their heads through the hog wire fencing used in constructing the first pens. Welded wire fencing of smaller mesh had been recommended to prevent such accidents[3]. This dairy uses 19 portable pens.

Most dairymen can build portable pens for less money than would be required to divide a calf barn into isolation stalls. Our costs for new materials were $7.50 per pen, with labor amounting to approximately an equivalent amount. A commercial company made six pens for a dairyman in Montgomery County, Ala., at a total cost of $15.05 per pen. It has been reported that one pen has been constructed from sawmill edgings and varnished, heavy corrugated cardboard from packing boxes, at a total cost of 50 cents for materials. This pen is so light that it can be moved by one man without assistance.

Dairymen say that the low cost of the pens, lack of necessity for fencing the calf pen area, except to prevent contamination by older

cattle, and the elimination of expensive barn insurance, are all factors in favor of adopting the pens. Some dairymen with costly calf barns have converted them to storage barns, poultry houses, or tool sheds, after testing the portable pens on a small scale. Some dairymen also reported that cows which were raised as calves in portable pens are more docile and more easily handled than those raised in groups in a barn.

The use of portable pens during the winter is often questioned by dairymen who have not used them. According to the official records of the U. S. Weather Bureau Station at Auburn,[8] lowest temperatures recorded here between 1943 and 1951, ranged between 9 F. and 22 F. Average lowest temperature was 15.37 F. for that period. None of the calves in the portable pens developed any sign of frostbite, and incidence of respiratory infections was low compared with that in the animals raised in buildings. Reports from farmers using the pens in northern Alabama, Tennessee and southern Illinois, indicate that calves appear able to withstand much lower temperatures than those recorded in Auburn.

Some of the data in literature indicate that calves exposed to extremely cold weather in open pens appear to do almost as well, and, under certain conditions, fare even better, than those in conventional calf barns. The open shed system has been recommended in Maryland,[9] Pennsylvania,[10] and even in Wisconsin[11,12]. Udall,[13] in New York, noted that raising calves in open sheds with nurse cows in the winter and in small pastures without access to buildings in the summer, almost eliminated respiratory infections and reduced the severity of septicemia and scours. Erb, *et al.*,[14] in Washington state, found similar results, with losses of 24% of 34 animals in a conventional calf barn compared to less than 2% of 57 head raised in an open shed. In the latter controlled experiment, the temperature went below —20 F. six times, with an average of 5.2 F. during each January of the two years of the test.

It is suggested that the portable pens could be used in many of the northern states as labor savers in mild weather and, if shown to be necessary during the coldest weather, the calves could be moved into pens such as those recommended by Udall[13] or Erb, *et al.*[14]

Summary

1. In a ten-year period 340 calves were kept in various enclosures at the Regional Animal Disease Research Laboratory. A comparison was made of mortalities in (a) individual stalls in a barn, (b) raised slat-floored pens, (c) barn and lot with older cattle, (d) concrete isolation pens, and (e) outdoor, portable isolation pens. All calves which lived long enough were inoculated one or more times with great numbers of oocysts of coccidia or were exposed to natural infections from older carrier animals.

2. Eighty-seven (25.59%) of 340 calves died, 19 before they were two weeks of age, and 68 some time later. The losses in the different shelters were as follows: (a) barn stalls, 52.63%; (b) slat-floored pens, 7.14%; (c) barn and lot with older cattle, 56.52%; (d) concrete isolation pens, 75%; (e) portable pens, 8.88%.

3. Calves in the portable pens required less labor for their care, and had less respiratory difficulties than those in other shelters.

4. Calves in the portable pens were kept free of worm parasites, except for Strongyloides, for 5½ years, with one exception. Those which were placed in the portable pens within 24 hours of birth developed fewer worms than did those which were left with their dams for a longer time. None was infected with lungworms, *D. viviparus*, and only one had hookworms, *B. phlebotomum*.

5. Calves in the portable pens withstood temperatures as low as 9 F. with no apparent harmful effects.

6. Portable pens have a practical application on farms. In Alabama, in 1951, there were 1,283 pens on 322 farms in 35 counties, with 2,708 calves raised in them. One 100-cow dairyman has had no losses from diseases since September 1949, whereas previous losses had been approximately 70% in a calf barn.

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(Continued on page 512)

Influence Of Protein On The Milk Fever Complex: A Four Year Study

PART II. KETOSIS (ACETONEMIA)

R. F. VIGUE, D.V.M., Springvale, Maine

This article continues the discussion of the role of proteins in metabolic disturbances of cattle. Readers are referred to VETERINARY MEDICINE for June 1952 for Part I, in which the author discusses clinical observations of the favorable response to adequate protein feeding in reducing incidence of milk fever. He also recommends protein therapy as treatment.

IT must be stated from the outset that the true etiology of ketosis (acetonemia) has not been determined. Failures of response, and relapses under recommended therapy, indicate that the commonly accepted concepts are incomplete. The disease appears to be restricted to late pregnancy or early lactation when the protein requirements of dam and embryo are the greatest, or when the animal is placed on a suboptimal protein allowance. This writer has considered milk fever a nutritional time-bomb[1] and agrees with other investigators who have referred to ketosis as an occupational disease of the modern dairy cow. However, it is not limited to milk cows, as it also occurs in sheep and goats,[2] beef breeds of cows,[3] and in steers[4]. The occurrence of prepartum ketosis in cows and ewes, and development of ketosis in steers on imbalanced rations, is not compatible with the belief that ketosis is brought about by the sudden withdrawal of sugar from the blood at the onset of lactation. Nonlactating animals and steers do not lose lactose.

There is at present no scientific evidence to support the view that ketosis is a simple carbohydrate deficiency. Shaw,[5] a serious student of this disease, has stated that ketosis appears to be much more than a carbohydrate deficiency, and that the feeding of molasses before freshening will not prevent its development. Fincher,[6] has observed that feeding of liberal amounts of molasses, although widely practiced, seems to have failed as a preventive of ketosis. Daugherty,[7] doubts that carbohydrate deficiency alone is the cause of ketosis. He has observed that it occurs frequently in herds where the carbohydrates fed are of the highest quality when measured by present standards. These observations seem to emphasize that the requirements of pregnancy and lactation in the bovine cannot be obviated by the simple addition of calories and in this respect the bovine does not differ from other species. Regarding carbohydrate therapy, Henderson[8] has noted that although a favorable response is relatively certain following injection of glucose, relapses are frequent, and in some herds, at least, glucose is not the entire answer to the problem. Reporting on 306 cases of ketosis, Gingras[9] claimed that 26% did not respond solely to glucose therapy.

Appearance of ketosis, like that of milk fever, corresponds with the period when it became customary to intensify dairying through extensive feeding and selective breeding of dairy cows with the object of higher milk production. Practically every serious investigator of this disease has noticed that where it is prevalent the feeding program is found wanting. As early as 1904-1905 Hansen, Rasmussen, Seiderer, Meier, and Gratia[10] reported that a one-sided feeding schedule was capable of giving rise to a condition clinically similar to milk fever, regardless of calving time, in high-producing cows. The symptomatology of their cases fits that of ketosis. In 1911 Law,[11] described the symptoms of ketosis under the title "depraved appetite." Diagnoses of pining disease, mania puerperalis, gastrointestinal catarrh after calving, chronic milk fever, etc. may have been more accurately diagnosed as ketosis. Alston[12] was one of the first to report on ketosis. He gave it the name "palsy after calving."

Patton[13] has made the statement that the disease has probably existed as long as cattle have been fed in America, and that the prevalence has probably increased directly as greater milk production has been obtained through selective breeding. The use of superior herd sires through the practice of artificial breeding may be a factor contributing to the apparent increase of ketosis. Better cows are obtained but no allowance is made for that fact in the feeding program. Duncan, Huffman, and Tobin[14] described ketosis in a herd of Jerseys kept under farm conditions and found that the disease was associated with feeding a ration of

poor quality soybean hay, corn silage, and a small amount of grain. Recovery followed the feeding of liberal quantities of medium quality alfalfa hay and cornstalks instead of the soybean hay and silage, and increasing the amount of concentrate. Carbohydrates were supplied to those off feed. Daugherty,[7] has considered ketosis a form of malnutrition resulting from either the failure of the owner to provide an adequate diet, or failure of the cow to fully utilize the nutrients provided. Link,[18] believes that poor roughage is a definite factor in the development of ketosis and has found that the feeding of hay of good quality and liberal amounts of grain is good insurance against ketosis. In this area the incidence of ketosis appears to be directly proportional to the quality of the hay when no provisions are made to compensate for poor quality roughage in the concentrates.

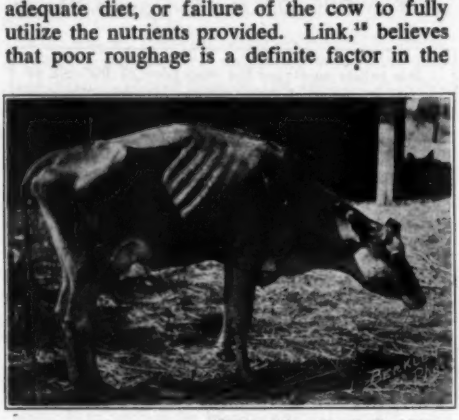

Photo courtesy Dr. J. T. Alston

Doctor Alston called this disorder "palsy after calving." In high producing cows, about 40% of milk fever is complicated by acetonemia.

Mead and Retliff have been quoted[13] as having observed ketosis in range cattle (Herefords), usually one or two months prior to calving. The great majority of their cases occurred on small farms where the cattle are fed rations consisting of cottonseed meal, cottonseed hulls, and poor quality native hay. Duncan and his associates,[14] were of the opinion that incidence of ketosis can be reduced in stall-fed cows by the feeding of hay of good quality and providing a liberal quantity of grain. It is sometimes impossible to do much about the quality of the hay, as some years are poor hay years. However, there can be no excuse for not improving the quality of the grain fed during those scant years. In the experience of Petry,[16] getting the cow to consume wholesome feed in quantities commensurate with the milk output and other needs of the cow seems to be the answer to the problem of ketosis. According to Henderson[8] it is probable that inadequate feed intake is responsible for most of the changes that occur in clinical ketosis, as similar symptoms to those of the uncomplicated disease can be induced in high producing cows simply by withholding part or all of the feed. One should be cautious in the use of the term "complicated cases" of ketosis in reference to those not responding to glucose therapy. While other conditions undoubtedly predispose or may be concurrent with the disease, the most common complication would appear to be a misunderstanding of the nature of ketosis.

Hendershott[4] has called attention that while ketosis is considered primarily a disease of dairy cattle, it occurs frequently in range cattle (grade Herefords), in steers as well as brood cows, in some herds kept in certain areas on the island of Molokai in Hawaii. He pointed out, the only available forage for the cattle in that region is the Kiawe bean, which grows to the exclusion of all other plants. In 1945, Shaw and his associates[17] advanced the working hypothesis that ketosis in cattle is associated primarily with inadequate nutrition prior to calving, the effects of which may be the depletion of liver glycogen and the impairment of the functioning of the liver in the maintenance of a normal liver glycogen and blood glucose level. McIntosh,[15] in demonstrating the identical histopathological changes in the livers of fatal ketosis in cows and of ewes dead of pregnancy disease, expressed the opinion that these changes may arise from dietary error or inadequacy.

According to Dye and McCandess,[19] the factors that usually precipitate ketosis in sheep are poor diet, or poor appetite leading to malnutrition. They quote Groenewald as showing that although the non-pregnant ewe develops mild symptoms simulating those of pregnancy disease (ketosis) when placed on a ration of poor veld hay for 24 to 48 days, the pregnant ewe exhibits symptoms in four to seven days under similar conditions. Attention should be called to the fact that pregnancy represents a normal condition during which there is a large demand for protein from the ewe's body. This protein is transferred to the growing fetus, is present in the fluid surrounding the embryo, and is required for the formation of the placenta and enlargement of the mammary system. In addition, blood volume of the pregnant ewe is increased, and this also requires additional protein. These investigators found the incidence higher in obese sheep, and in those with multiparous pregnancies.

Patton,[12] in his studies on ketosis concluded

that if either the concentrate or the forage is replaced by a better balanced feed the incidence of ketosis is lowered. Replacing the concentrate is more effective than changing the roughage. Substituting good feed for both renders the problem of ketosis a minor one. He further observed,[20] that ketosis occurs in high, or fairly high-producing cows which are maintained on a diet inadequate for their requirements, in quantity or quality, or both. He noticed that the condition is not limited to well nourished cows but may appear in any bovine animal on a diet relatively inadequate. It depends on the relation between intake and output; thus, the higher producers in a herd may suffer on a ration that is adequate for the average cow in the herd. Connecticut dairy specialist Hesseltine[21] has pointed out that it is not always true that high-producing cows get more grain per 100 lb. of milk than do low producers. It is a fact, that high producers eat more concentrates during the year, but the grain consumed per 100 lb. of milk is about the same. A careful study of all dairy herd improvement association records in Connecticut for two years indicates that the top half of the herds eat slightly less grain per 100 lb. of milk than do those herds below the average. The high herd in milk and fat in one county in 1951, had the lowest consumption of grain per 100 lb. of milk. Sampson[2] in his excellent review, writes that from evidence now available two conditions are essential in preventing clinical ketosis in the pregnant or lactating cow and ewe; (1) an adequate daily ration of nutritious feeds, and (2) a good appetite on the part of the animal.

Role of the Liver in Ketosis

The liver appears to be of particular importance in protein and carbohydrate metabolism. It is in this organ that amino acids are converted to sugar and other foodstuffs in case of need. As a result of experimental work with radioisotopes, it is known that the liver is the most important of the tissues involved in plasma protein synthesis. Chassin[22] has called attention to the fact that in healthy animals a state of equilibrium exists between the blood proteins and the protein of the tissues. A hypoproteinemia is therefore a reflection of tissue protein depletion. When there is an inadequate intake of protein to meet the demands of maintenance, repair, growth, pregnancy, and lactation, the protein is not replaced fast enough, and protein balance between blood and tissues no longer exists. The fats and carbohydrates of the body are used for energy, but when these stores are exhausted, calories must be obtained from some source. Hence the body depletes the protein reserves in the liver and other organs and tissues. These proteins are converted into carbohydrates, some of these into fats to supply the caloric requirements, so are not used to build tissues, blood proteins, etc.

Tolly[23] has shown that milk proteins are derived from blood proteins, so that the liver is always under stress in heavy producing cows. Synthesis of protein requires that all amino acids going into the formation of the protein molecule be present simultaneously for synergy to be effected. Hence absence of some of the essential amino acid components may mean that these have to be drawn from the cow's liver and other tissues unless they are provided in the ration. Attention was previously called to the high protein content of colostrum[1] which in some instances reaches over 20%. It should also be remembered that the bovine fetus grows two-thirds of its size in the last three months of pregnancy. It would thus appear that the custom of feeding dry cows low protein, high carbohydrate feeds during the dry period may predispose to the development of ketosis. This procedure adds weight to the cow's body, but the addition is chiefly in the form of adipose tissue. What is required is the addition of "red meat" to the cow's body to increase the protein reserves as much as possible. Groenewald, *et al.*,[24] have pointed out that obese ewes are infinitely more susceptible to ketosis than those of average weight.

The proteins of the liver seem to be especially labile, and during periods of fasting, or excessive demands such as occur in late pregnancy, early lactation, or during disease, the liver loses considerably more protein than do the other organs of the body. The great rapidity with which the animal organism is capable of losing protein under conditions of starvation is illustrated by reported data of an experiment in which rats were permitted to fast during a seven-day period. At the end of that time the protein loss from a number of body organs of the animals was measured. The loss from the liver was the most dramatic, about 40% of the liver protein having been depleted during the seven-day period. These data emphasize the fact that the supply of stored protein may be rapidly depleted. While the cow has provisions for storing carbohydrates, fats, minerals and some vitamins, there is practically no storage of protein, *per se*. Dietary sources represent the only readily available protein. Under conditions of heavy demands such as exist during the last

third of pregnancy and during early lactation, protein metabolism is greatly accelerated. In cases of extreme demands, the animal can use only the structural protein present in its cells for the most essential purposes, and in doing so unavoidably injures every tissue in its body. Protein synergy requires that all the amino acids composing the protein molecule be present simultaneously; thus, the addition of incomplete protein supplements does not fulfill requirements. This factor is probably responsible for failure of former feeding experiments.

Histopathology in Ketosis

Autopsy findings in fatal cases of ketosis are

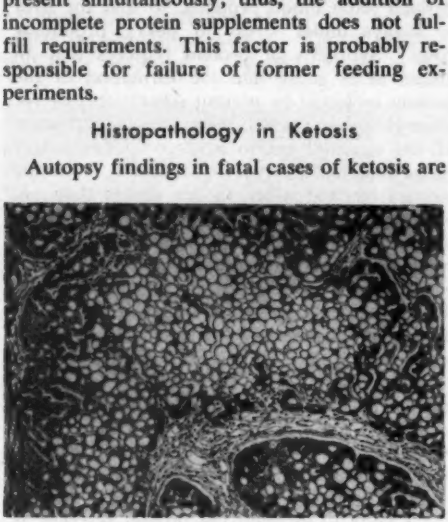

Fig. 1. Fatty infiltration and degenerative changes occurring in fatal cases of ketosis in dairy cows.

generally confined to the liver where the changes vary from fatty infiltration to cirrhosis. (Fig. 1 and 2). Hendershott[4] observed that from a pathological point of view all cases appear to be similar in gross and histopathological changes in that they are constantly found to be in the liver. However, a contrast arose when autopsy findings of fatal ketosis of dairy cows were compared with those found in native range cattle on Molakai, where his studies were conducted. While the liver changes found in fatal cases of dairy cows are those of diffuse toxic necrosis, lesions in the Molakai cases were those of atrophic cirrhosis. Recent nutritional studies have provided evidence that there is a close relationship between fatty infiltration of the liver and subsequent degenerative changes leading to cirrhosis. The same changes that occur in the liver of cows dying of ketosis can be produced experimentally in rats by feeding a diet inadequate in protein. Casein, the chief protein in milk, will prevent the development of this syndrome of functional impairment and extensive pathological damage in the liver. Carbohydrates will not prevent the development of liver changes associated with ketosis as shown by MacFarland and McHenry[25] in recent experiments on rats. Lillie,[26] Lowry,[27] and Post and Patek[28] have reported that there are strong indications of an intimate relationship between protein deficiencies and liver damage. Recent investigations of Patek,[29] Butt and Snell,[30] and Fagin and Zinn[31] indicate that high protein intake causes marked regeneration of damaged livers. Methionine, one of the essential amino acids present in good proteins, is of significant importance in liver metabolism. Choline and inositol, two vitamin B-complex factors, are other substances which have been proved to possess specific lipotropic properties.

Evidence has recently been presented by Whipple and Robscheit-Robbins,[32] Tompkins,[33] and Bibb[34] of the close relationship between protein deficiency and the development of eclampsia and pregnancy toxemias in women. Insufficient amounts of dietary protein during this period may lead to development of hypoproteinemia, rendering the liver more susceptible to damage. Roderick and Harshfield[35] were the first to call attention to the striking similarity of liver pathology in human pregnancy toxemia and ketosis of animals.

Shaw,[36] reporting on the histopathological study of 14 cows slaughtered in various stages of ketosis, observed that the gross and microscopic changes in the various organs revealed a striking resemblance to those seen in experimental animals exposed to a noxious agent causing the alarm reaction of Selye[37]. He speculates as to what the noxious agent may be and suggests the possibility hyperactivity alone or combined with other factors such as bad management, changes in the feed, etc., after calving may constitute a noxious stimulus, producing shock in a cow overstressed during pregnancy by the (additional) needs of the embryo development and the neutralization of toxins. Investigators in human medicine have reported a parallel in healthy, apparently well nourished persons who fracture long bones, sustain extensive burns or undergo extensive surgical intervention. These patients go into a decidedly negative nitrogen exchange.

Some of the causes (noxious agents) that contribute to this phenomenon are obvious and readily understood. Lost red cells, plasma and exudates have to be replaced; fresh callus or granulation tissue has to be supported; fever and infection hasten protein breakdown; and failure of the patient to ingest food of adequate caloric value induces the burning of protein. Some investigators, notably Cuthberson,[38] Howard,[39] Browne, Schenker and Stevenson,[40]

and Albright[41] have expressed their belief that the negative nitrogen exchange is greater than to be explained by these factors. They believe that there is a general catabolism of tissues in effect for a number of days, coupled at times with an interference with the utilization of ingested protein. The cause for this catabolism and antianabolism is generally attributed to the adrenal cortical hormones and the alarm reaction of Selye, with the thyroid hormone (parathormone) perhaps also playing a part. Werner, Habiv, Randall and Lockwood[42] are inclined to doubt the operation of a significant endocrine factor, because Co Tui[43] and Werner[44] could prevent the development of the negative nitrogen balance if these same patients were fed sufficiently large amounts of proteins and calories.

Preventive Measures and Treatment

Feeding experiments which began in 1946, and are still in progress have indicated that the use of proteins of high nutritive value will reduce the number of recurrences of both milk fever and ketosis. The nutritional approach as a possible solution to these conditions is not new. McKittrick[45] has also noticed that in his purebred herd of Guernseys there was a significant reduction in the incidence of ketosis when 90 lb. of meat scrap were added to each ton of grain. Cropsey[46] has written that the addition to the ration of 10% animal protein supplement to replace some of the vegetable protein appears to prevent the disease, and also hastens recovery of sick animals. The failure of protein to prevent these diseases in the past can be explained on the basis of their amino acid content. The most common supplement fed was linseed oil meal and its nutritive value was inadequate. Animal proteins are superior in that they contain all the essential amino acids in liberal quantities and therefore supply all the amino acids or the building blocks that enter into the synthesis of the protein molecule, whether it be in tissues or casein.

The importance of supplying calories to the cow with ketosis cannot be denied. Its value is well known and in many instances is all that is required for the recovery. However, for the cases that relapse or do not respond at all, the addition of protein to the therapy is rational. The importance of integrating caloric intake with protein cannot be overemphasized. These two aspects of bovine nutrition cannot be dissociated as is presently being done by current investigators. While great strides have been made in parenteral protein nutrition, and its importance is unquestioned, recent studies have confirmed the common sense point of view that the best way to feed a cow is by her mouth. Not only is the oral route easier, cheaper and safer, but it has recently been shown that the same number of grams of protein absorbed from the gastrointestinal tract give a slightly greater nitrogen retention than when given by vein[47]. Anabolic processes make it necessary that the protein requirements be met and for the maintenance of a dynamic protein equilibrium, many of the component amino acids of complete proteins are essential. The proportion of these in the ration determines the degree to which they can participate in the synthesis of new protein.

The value of parenteral amino acids in the treatment of calcium-refractory cases of milk

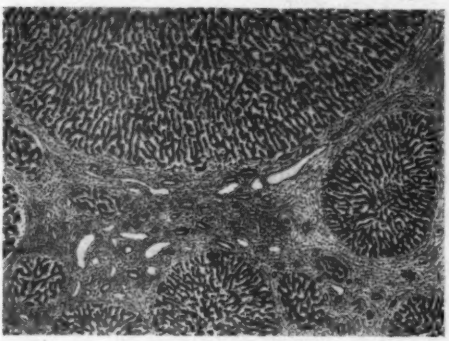

Fig. 2. Cirrhosis of liver seen in chronic cases on suboptimal protein allowance.

fever has been reported[1]. The addition of amino acids to the dextrose in the treatment of ketosis is also indicated, where the conventional therapy does not result in recovery. The usual amount is 1,000 cc. of a 15% solution of those derived from the hydrolysis of casein (parenamine®[1]) which is added to 3,000 cc. of a 15% solution of dextrose and infused slowly, employing the technic described by Roberts and Dye[48]. Provisions are also made to supply additional protein by mouth. Excellent results have followed administration of 1 lb. daily of supplementary sources of amino acids in the form of protein hydrolyzates (amiprote®[2]).

Shaw[5] believes that some degree of more or less permanent damage to the liver may account for the failure of many cases to respond readily to glucose therapy. The usual damage to the liver is fatty infiltration leading to degenerative changes, although in Hendershott's cases cirrhosis was the predominant pathology. These types of liver damage have been proved to be highly amenable to treatment with a high

®[1]Winthrop-Stearns, Inc., New York 18, N. Y.
®[2], ®[3]U. S. Vitamin Corp., New York 17, N. Y.

protein ration and the administration of specific lipotropic agents such as choline, inositol, methionine, and liver extracts. Protection against the same liver damage occurring in ketosis has been achieved through feeding a high protein diet of nutritive sources, including these specific lipotropic substances. Hence it is rational to add these lipotropic agents to our therapy in ketosis. Good results have followed the use of one pint daily of a solution containing all known lipotropic substances (metischol®[3]). This product is also available for injection.

Recently the use of testosterone for its anabolic effect has gained popularity in human medicine. This hormone has a profound effect on metabolic processes such as growth, muscle development, and nitrogen balance. It is believed that testosterone aids in the synthesis of protein and causes nitrogen retention. In a limited number of cases (13 cases) of ketosis where anorexia was persistent, the use of a single injection of 1,000 mg. depo-testosterone cyclopentylproprionate®[4] had a prolonged beneficial effect upon the appetite and appears to be of value.

The practice of veterinary medicine has progressed remarkably since the time when it was generally believed that starvation and bloodletting represented effective therapy and were to be applied almost routinely, regardless of the disease for which the animal was being treated. The one denied the animal essential exogenous protein, while the other removed rather efficiently a large portion of what little protein reserve the animal might have had. It is now generally recognized that protein, an essential food, is also a powerful and valuable therapeutic weapon. It is an ideal therapeutic agent and one that possesses a rare quality, in that it can be administered to practically every animal in almost any dosage desired.

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(*Continued on page 506*)

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White Blood Cell Count In Hog Cholera†

WILLIAM L. SIPPEL, B.S., V.M.D., M.S., Tifton, Georgia

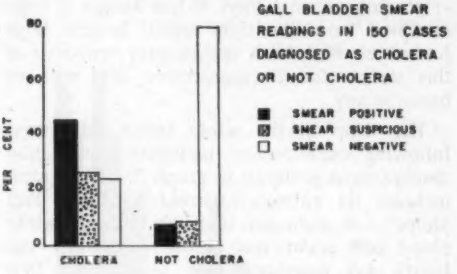
THE clinical diagnosis of hog cholera is usually not difficult as the practitioner is able to arrive at it by considering the history of the drove, symptoms exhibited by affected animals, and lesions observed at autopsy. However, there are a number of cases that either do not conform to the usual manifestations of the disease or where for ethical or other reasons, a diagnosis based on something more substantial than opinion is desired.

It is well known that at present the only means of making a definite diagnosis is by the inoculation of susceptible pigs with suitable material from an affected animal. This method is so time-consuming and expensive as to place it beyond the realm of practicability in most instances. For these reasons, a simple, rapid diagnostic test of a definitive nature is needed for hog cholera.

Tests considered have been the gall bladder smear, brain histopathology, blood cell sedimentation rate, differential white blood cell counts, total white blood cell count, and others. The gall bladder smear has not proved sufficiently critical as is illustrated by graph 1 on 79 cases definitely diagnosed as cholera and 71 as not cholera. Benson's[1] findings agree with this conclusion.

Changes identified in microscopic sections of the brain have been found by Seifried[2] and others to be associated with hog cholera. In the writer's experience, this type of examination has been helpful. However, negative slides were found in a number of cases which were believed to be hog cholera. Helmboldt and Jungherr[3,4] have found this change to be statistically significant for hog cholera but reported a few false positives and negatives. The reliability of a diagnosis based on brain histopathology is at present disputed. Regardless of the outcome of this discussion, this method is not practical for practitioners.

At the suggestion of Dr. Meredith Gardiner, formerly of our staff, a study on the red blood cell sedimentation rate in hog cholera and other diseases was conducted. In general, the rate appears to be increased in hog cholera. However, a number of other diseases, including pneumonia and eperythrozoonosis, also give a rapid rate of red blood cell sedimentation. For this reason, and other difficulties connected with the test, it was decided that it is not reliable nor sufficiently definitive.



Graph 1

Lewis and Shope[5] have indicated that the differential white blood cell count is of value in diagnosing hog cholera as they noted a decrease in the polymorphonuclear leukocytes and lymphocytes. This method is practical for use in the field although possibly excessively time-consuming for routine use. Fluctuations in the percentage of neutrophils and lymphocytes on the two hogs cited by these investigators indicate that this method may not be as critical as desired. Our experience with this method has been too limited to warrant comment.

White Cell Count is Practical

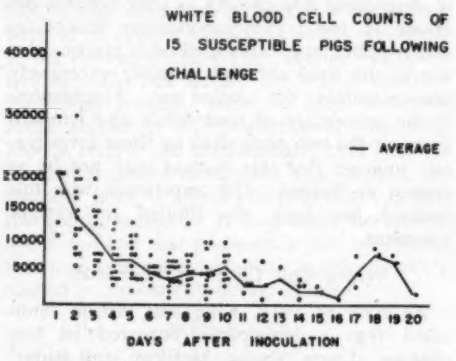
As early as 1910, King and Wilson[6] indicated that a leukopenia occurred in hog cholera. Lewis, Shuler, McElroy, and Ritter[7] in 1914, Dinwiddie[8] in 1914, and Regner[9] in 1923 also called attention to this phenomenon. In 1929, Lewis and Shope[5,10] in two excellent articles called attention to this diagnostic criteria. Unfortunately the method has not been widely adopted by practitioners. Possibly this is due to the difficulty in obtaining blood from swine. Such limitations have been obviated by the technic of bleeding swine from the anterior venacava described by Carle and Dewhirst[11]. For the last two years, white blood cell counts have been made on almost every hog presented for autopsy at this laboratory. A blood sample is obtained from the

†Contribution of the Department of Animal Pathology, Georgia Coastal Plain Experiment Station. Published with the approval of the resident director as journal series paper no. 4.

anterior venacava with a sterile needle and syringe and a portion discharged into a tube of broth for culture and approximately 5 cc. discharged into a tube containing a mixture of sodium and potassium oxalate. The oxalated sample is used to make the white blood cell count. Several practitioners in South Georgia have been encouraged to make use of this method and they are now enthusiastic about its benefits in their practice. Some carry the necessary equipment with them and make the count on the farm. There is little danger to the hogs from this method of bleeding if care is taken to avoid the phrenic nerve. Hoerlein,[15] *et al.*, indicate that there is less danger if hogs are bled from the right side. Several hogs have been bled from the anterior venacava at this station for 28 consecutive days without harm to any.

The drop in the white blood cell count following experimental inoculation with hog cholera virus is shown in graph 2. This graph includes six animals reported by Lewis and Shope[5]. It indicates that the average white blood cell count was below 10,000 by the fourth day postinoculation, usually the first day of symptoms.

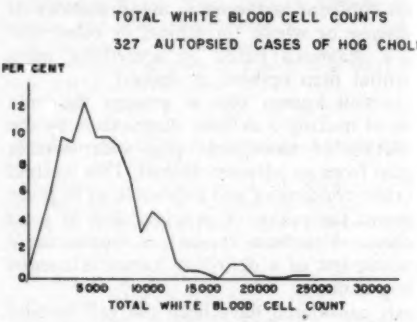
Hogs presented for autopsy are usually from herds in which illness has been apparent for



Graph 2

some time. As the drop in the white blood cell count is present at or before the time visible symptoms develop in pigs, no trouble should be encountered from a delay in decrease in the count. It has been noted repeatedly, where three or four swine were presented for autopsy from the same drove in which cholera was found, that an occasional pig would have a white blood cell count above the range usually recognized as characteristic of cholera. It is possible that those with high counts were suffering from some disease usually considered secondary and thus cast an unfavorable light on the data presented herein. This is most likely in cases of over-reaction following vaccination. Therefore, practitioners have been advised to obtain a minimum of three blood samples from sick pigs when using this method as a diagnostic aid. From a practical standpoint it is believed that in cholera-affected droves all other diseases are secondary to cholera. For this reason, it would not be possible to exclude these cases from the data without becoming arbitrary.

Graph 3 illustrates the result of white blood cell count on 327 swine on which a diagnosis of hog cholera was made based on the history



Graph 3

of the pigs, symptoms, and autopsy lesions. Individual swine, from cholera-affected droves, in which the white blood cell count was low but where the symptoms or autopsy lesions were not typical of cholera, have not been counted. The graph indicates that a count below 10,000 is indicative of hog cholera. The second peak from 12,000 down to 10,000 indicates that cases in this range should be regarded with suspicion. Results of over 600 counts on apparently normal swine indicate the normal to be about 17,500 with extremes of from 14,000 to 40,000 white blood cells per cubic millimeter of blood.

Sampling for Office Examination

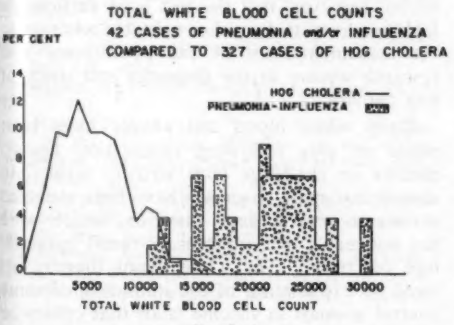
Blood samples have been stored at room temperature, at incubator temperature, and in the refrigerator for 24 hours, following which a second count was made. Results indicate that when using a sodium and potassium oxalate mixture as the anticoagulant, the counts are not significantly different following storage. Best agreement was found in the refrigerated samples, but even those kept in the incubator at 37.5 C. were not misleading provided hemolysis had not occurred. This fact may be of importance to busy practitioners who are not able to get back to the

office and make the count for several hours. Lewis and Shope[8] found that when heparin was used to prevent clotting, a drop in the white blood cell count occurred during storage.

As an anticoagulant, a solution consisting of 4 gm. of potassium oxalate, 6 gm. of ammonium oxalate and 90 cc. of water is used in this laboratory. Three drops (0.15 cc.) of this solution are put in an ordinary Bang's tube and slowly evaporated to dryness on a radiator or in an oven. Excessive heating will interfere with the anticoagulant activity. Temperatures over 130 F. should be avoided. This amount of anticoagulant will take care of 5 cc. of blood or about half a tube full. After slowly discharging the blood into the tube, it is rotated gently end to end to dissolve the oxalate solution. The technic of the white blood cell count is well known or can be found in Coffin's[18] or almost any book on laboratory procedures.

Factors That May Confuse

The white blood cell count in other diseases has been considered. Graph 4 illustrates the count in 42 cases diagnosed as pneumonia or influenza. It can be seen that none of these counts are below 11,000 and that most of them are above 15,000. Slight leukopenia has been



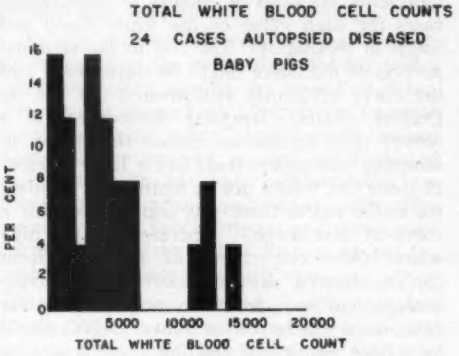
Graph 4

noted in influenza but not nearly to the degree seen in cholera. It is not likely, therefore, that hog cholera would be confused with influenza or pneumonia on the basis of the WBC count.

Thirty-one cases of Salmonella infection studied have also been considered. Nine per cent of these cases had a white blood cell count below 12,000, although none were below 10,000. This possibly might cause confusion with hog cholera. It is possible that some of the cases with low counts which were diagnosed as salmonellosis were, in fact, from pigs that were also suffering from cholera.

In 15 natural outbreaks of salmonellosis, Lewis and Shope[8] found an average white blood cell count of 30,000 with extremes of 16,000 and 56,000. They also give the results on 25 experimentally induced cases of Salmonella infection which indicated an average white blood cell count of 15,000 with extremes of 8,000 and 25,000. A single animal had the 8,000 count for one day only. Counts for the preceding and following days were 18,000.

Twenty-one cases from which the swine erysipelas organism was recovered were compared with the count in hog cholera. One case from which this organism was recovered had a



Graph 5

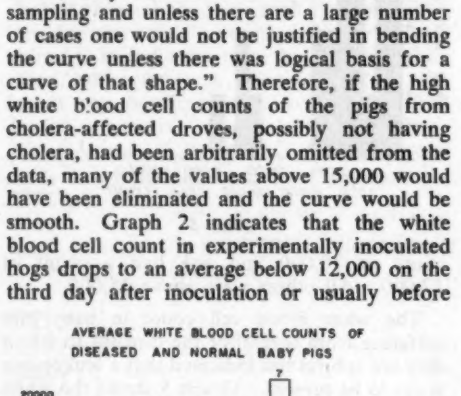
count of 10,000 and one had a count of 12,000. All others were above 15,000.

The white blood cell count in baby pigs suffering from several of the diseases to which they are subject has indicated that a leukopenia is apt to be present. Graph 5 shows the white blood cell count in 24 field cases presented for autopsy at our laboratory. Most of these were below 5,000. Doctor Gardiner made white blood cell counts on several litters of pigs belonging to the Animal Husbandry Department and to the Animal Disease Department. (Graph 6). At birth, five litters totaling 45 pigs born alive, but affected with a baby pig disease, had an average white blood cell count of 8,000. At one week of age, 14 of them had died and the average white count was 9,000. At two weeks of age, one more pig had died and the average count was 8,000. In two unaffected litters totaling 13 pigs, the average count was 15,000, at birth; at one week, 13,000; at two weeks, 11,000; at three weeks, 7,000; (one litter not counted beyond second week) at four weeks, 12,000; at five weeks, 16,000; and at six weeks, 22,000. No pigs were lost in these two litters. These results would indicate that consideration must be

given to the age of the pig when interpreting counts in the light of leukopenia and hog cholera.

During the past fall and winter, six outbreaks of Aujeszky's disease in pigs, ranging in age from three weeks to maturity, were referred for study. It was suspected in several others from which virus recovery failed. The white blood cell counts of these pigs were usually well below 10,000. Brain histopathological changes were similar but usually more severe than those seen in hog cholera.

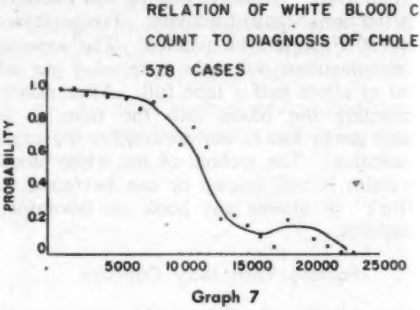
Graph 7 represents a probability curve for 578 autopsied cases considered. This curve represents the ratio of cholera to non-cholera cases for each value of the white blood cell count in thousands. The rise in the terminal portion of the curve might be disregarded and the curve arbitrarily straightened out for, as Ezekial[14] states, "Irregular differences (in a curve) may be due to chance fluctuation in sampling and unless there are a large number of cases one would not be justified in bending the curve unless there was logical basis for a curve of that shape." Therefore, if the high white blood cell counts of the pigs from cholera-affected droves, possibly not having cholera, had been arbitrarily omitted from the data, many of the values above 15,000 would have been eliminated and the curve would be smooth. Graph 2 indicates that the white blood cell count in experimentally inoculated hogs drops to an average below 12,000 on the third day after inoculation or usually before



Graph 6

visible symptoms have appeared. After the fifth day, only two hogs had counts above 10,000. These were in a chronic case of Lewis and Shopes[15] followed for 37 days after inoculation, and a single count of 13,000 in one of our animals. Average values reported by Dunne,[15] *et al.*, were below 10,000 after the fourth day. There was a tendency for a slight rise in the white blood cell count of hogs with a more chronic course but these did not rise above 10,000 with the exceptions of the animals cited above.

When the information derived from graphs 2, 3 and 7 is considered together, it tends to indicate that white blood cell counts in the 10,000 to 12,000 range should be regarded with suspicion if cholera is a possibility and that counts below 10,000 are strongly indicative of hog cholera.



Graph 7

Discussion

The data presented in this paper do not indicate that the white blood cell count is sufficiently reliable to be depended upon solely in making a diagnosis of hog cholera. It is believed, however, that the test is of sufficiently high accuracy to furnish a valuable addition to the armamentarium of the practitioner and research worker in the diagnosis and study of hog cholera.

Daily white blood cell counts have been made on pigs following vaccination against cholera or challenge with virulent virus. In several instances, reactions have been detected of one to several days' duration, which were not noticeable in symptoms or rectal temperature reactions. The white count thereby offered an explanation of the immunity of some control animals in vaccine trials that otherwise would have been unaccountable.

Summary

1. Data are presented indicating that a white blood cell count below 10,000 per cmi. is indicative of hog cholera provided the history, symptoms, and lesions are in agreement with the diagnosis.

2. Cases of pneumonia or influenza, Salmonella or erysipelas infection do not result in white blood cell counts likely to be confused with hog cholera.

3. Aujeszky's diseases and certain baby pig diseases result in white blood cell counts in the hog cholera range.

4. The white blood count is a valuable diagnostic or research tool for hog cholera.

Acknowledgments

The assistance of Drs. Clyde Boyer, Meredith Gardiner and Jesse S. Sloan in performing many of the autopsies referred to is gratefully acknowledged. The technical assistance of Hughie J. Godwin and A. B. Stembridge in making white blood cell counts is appreciated. Thanks are due Dr. H. C. H. Kernkamp for reviewing this manuscript and making several helpful suggestions.

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Some ice cream manufacturers are accused of substituting vegetable oils for butter fat in ice cream. Resultant product is said to be palatable. This adds proof to that old saw that no matter how poor a product may be, some one will always make it cheaper and sell it for less.

Permit Required to Import or Transport Interstate Restricted Animal Disease Organisms and Vectors

In recent months, several instances of illegal movement of animal disease organisms and vectors in interstate commerce have come to the attention of the U. S. Department of Agriculture. Conditions under which restricted organisms and vectors can be moved under permit are explained in the Department's BAI Order 381, Part 122, entitled, Rules and Regulations Relating to Viruses, Serums, Toxins, and Analogous Products, and to Certain Organisms and Vectors.

Because of the inherent danger of such movements and the increasing need for taking every precaution against the spread of infectious animal diseases, all laboratories, research institutions, and others dealing with animal disease organisms and vectors are requested to comply with this order. Movements are allowed under permit only when such shipments serve the public interest and after ample safeguards are provided to protect against the further dissemination of such agents.

Under authority of the BAI order referred to in paragraph one, no organisms or vectors shall be imported into the United States or transported from one state or territory or the District of Columbia to another state or territory without a permit issued by the Secretary and in compliance with the terms thereof.

Section 122.2 provides that the Secretary may issue, at his discretion, a permit when proper safeguards have been set up to protect the public. Application for such a permit shall be made in advance of shipment and each permit shall specify the name and address of the consignee, the true name and character of each of the organisms or vectors involved, and the use to which each will be put.

All persons engaged in research involving the use of organisms or vectors as defined above should become familiar with the contents of this notice. Further information and applications for permits may be obtained by writing to the Chief, Bureau of Animal Industry, U. S. Department of Agriculture, Washington 25, D. C.

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Annual production of oil meals in the United States has increased 400% since 1930. These meals have a market value of approximately $1,000,000,000. and now comprise 65% of our supply of high protein feeds.—*Nutrition News Bul.*

Rabies In Cattle. I. Prevention Of Vampire Bat Paralytic Rabies, Derriengue, By Vaccination With Chick-Embryo-Adapted Rabies Virus

C. R. SCHROEDER, D.V.M., JACK BLACK, R. L. BURKHART, V.M.D., and HILARY KOPROWSKI, M.D.,* Pearl River, New York

IN 1949, an increasing number of paralytic deaths were observed in cattle in an area surrounding LaCeiba, Honduras, Central America. LaCeiba, one of the principal cities of Honduras, is on the north Caribbean Sea coast. In the area adjacent to LaCeiba, the Standard Fruit and Steamship Company operates extensive banana plantations. The company maintains many thousand head of cattle, mules, and horses, for meat and draft purposes. They also maintain two dairies of approximately 500 milking cows. Local ranchers operate small dairies and grow some beef for the local native population. The company feels some responsibility for the native livestock grower and makes every effort to cooperate with the local and national governmental agencies to control livestock diseases and maintain good health in the community.

Beef cattle, for the most part, are maintained on range. Cattle inventory is taken once a year, and, in the past losses were attributed mainly to old age, snake bite, and starvation. In 1949, the company lost 66 head of cattle, but losses were higher in privately owned herds. In 1950, many animals were found dead on range, and there was a pronounced increase in animal losses. The problem became so acute that it was deemed wise to have an immediate investigation. Company management secured the services of Dr. Fernando J. Gonzales of San Pedro Sula.

In May 1950, he arranged to send frozen specimens, including a calf's head and two vampire bats, to Dr. Herbert B. Elliott, director of Diagnostic Laboratory of the Louisiana Livestock Sanitary Board, Baton Rouge, with the approval of Dr. F. B. Wheeler,[1] secretary and executive officer. Elliott[2] demonstrated Negri bodies in impressions from the calf brain. The specimens were sent to the U. S. Public Health Service Virus Laboratory at Montgomery, Ala., where Dr. R. E. Kissling[3] isolated rabies virus by mouse inoculation from calf brain. The bats were negative. In June, additional specimens were sent to the Louisiana laboratory where inclusion bodies were again demonstrated. Rabies virus was demonstrated the second time at Montgomery. Doctor Elliott pointed out that, because of circling symptoms, listeriosis was suspected, but this was ruled out by failure to cultivate the organisms.

Vampire Bat Rabies

The vampire bat was first suggested as a vector of rabies in 1911, by Carini,[4] who identified Negri bodies in the brains of cattle dying of a paralytic disease in Brazil. Further outbreaks occurred in other parts of South America, and it was noted that vampire bats were abroad in the daytime and that all cattle attacked by such bats developed paralysis and died. In 1921, Haupt and Rehaag[5] described an outbreak, and showed that the disease was rabies and that the vector was the vampire bat. In 1925, a paralytic disease appeared in cattle and other animals in Trinidad, despite the absence of canine rabies in that locality, and by 1929, the disease appeared in man. In 1936, Pawan,[6] in Trinidad, reported infection of the vampire bat, *Desmodus rotundus murinus*, with rabies virus, by histopathology, animal inoculation, cross-immunity, and serum neutralization tests. The disease has been recognized in many sections of Central and South America,[7] and Johnson[8] in 1948, stated that it had been prevalent in the Pacific coast states of Mexico for at least 37 years.

An investigation of cattle losses in and adjacent to LaCeiba was undertaken to confirm the suggested cause of death. The incidence of paralytic deaths at that time was relatively high. In one native herd of 140 head, 40 paralytic deaths were reported in a three-month period. A history of rabies in dogs in the area was lacking. The vampire bat,

*The authors are indebted to Messrs. R. H. Smith, T. A. Ledyard, G. L. Morton, V. C. Owen, and E. Knight, of the Standard Fruit and Steamship Company, for assistance in carrying out this work.

D. rotundus murinus, is common to the area, and was found in abundance in hollow trees on the ranges where cattle deaths were most frequent. It is interesting to note that no day-flying bats were observed, or at least, there were no reported daylight attacks on cattle. Bats were collected by smoking them out of trees in the daytime. Fifty-four vampire bat brains and a few salivary glands were collected and placed in 50% neutral glycerin. Attempts to recover rabies virus from these tissues were unsuccessful.

Field Investigation at LaCeiba

Bat bites in back of the ear, on the neck, and over the shoulder are common in cattle, mules, and horses in the area. Seven sick cattle were observed in the initial study. Symptoms similar to those described by Gilyard[7] were observed, consisting of progressive, ascending paralysis and death. The disease ran a course of four to five days, at which time the animals were prostrate, with no sensory reflexes. Animals were destroyed and a complete postmortem examination was made. Blood and brain were cultured, and blood smears prepared. Fresh tissue impressions and formalin-fixed sections were made from Ammon's horn and medulla. Fresh tissues were placed in 50% buffered glycerin for transport by banana boat to Pearl River, N. Y., by way of New York City.

Laboratory Investigations

Blood smears revealed Anaplasma and Babesia; blood and brain cultures were negative for pathogens. Blood sera from the seven cattle, ten additional cattle and 17 mules were negative for agglutinins for Brucella, Listeria, and Pasteurella.

Brain impressions revealed intracytoplasmic inclusions in ganglion cells identified as Negri bodies. Six of the seven specimens yielded virus by mouse inoculation. The fixed sections showed typical rabies encephalitis with inclusion bodies.

The Honduras strain of virus was identified by cross-protection test. Groups of guinea pigs were immunized with rabies vaccine modified virus avianized®. Eight weeks after immunization, the animals were challenged with (a) guinea-pig-brain tissue originating from the first mouse-brain passage of the Honduras strain originating in cattle; (b) canine salivary gland tissue infected with a NYC strain of street virus[8]. The results of this experiment are summarized in table 1. These findings demonstrated that the Honduras strain is immunologically closely related to NYC canine-origin street virus. These results are similar to those reported by Johnson[8] working with the Mexican strain of vampire bat rabies virus.

TABLE 1. Identity Test
Virus Isolation from Cattle — LaCeiba, Honduras

	Mortality Ratio of Guinea Pigs Challenged with Dilutions of Street Virus Deaths/total					
	NYC Strain	Honduras Strain				
	1:5	1:5	1:20	1:80	1:320	1:1280
Vaccinated	0/14	0/14				
Controls	10/10	6/10	6/8	8/8	8/8	5/8

Field Trials to Determine Safety

LaCeiba, Honduras. The history of the outbreak, symptomatology, and laboratory studies indicated that the investigators were dealing with bat-transmitted paralytic rabies. Total destruction of the bat population seemed a hopeless task. It was decided to vaccinate cattle to determine the safety and field effectiveness of the vaccine in the bovine. Over an eight-month period, 3,792 cattle, over one year of age, and 24 four-month-old calves were vaccinated. Because there was no precedent, two dog doses were administered to adult cattle, and one dog dose to calves. The intramuscular route was used in 266 cattle and the 24 calves, and the subcutaneous route in 3,526 cattle. Two deaths due to rabies, confirmed by laboratory examination, and attributed to prevaccination infection, occurred at four and 15 days postvaccination. Three adult cattle died, two, three, and five days postvaccination, from undetermined causes. These deaths were not considered failure of vaccination as it is obvious that there was insufficient time between vaccination and death for immunization to have taken place. Although rabies deaths were reported in nonvaccinated cattle in these areas, rabies did not occur in the vaccinated

®Lederle Laboratories Division, Pearl River, N. Y.

Rabies vaccine modified virus avianized is produced in chick embryos from the Flury strain of rabies virus, isolated by Leach and Johnson (Leach, C. N., and Johnson, H. N., *Am. Jour. Trop. Med.*, 20:335, 1940), and carried by Johnson through 136 intracerebral serial passages in day-old chicks, during which time the virus became modified for rabbits and dogs. This strain was adapted to the developing chick embryo by Koprowski and Cox (Koprowski, H., and Cox, H. R., *Jour. Immunol.*, 60:533, 1948), and was passed through 80 chick embryo generations when its invasive power for parenterally inoculated rabbits appeared to be entirely lost, and attenuation of its virulence for hamsters and guinea pigs seemed to have taken place. Following intramasseter inoculation in dogs, the virus retained excellent immunogenic potency while its capacity to produce disease was entirely lost. The commercial vaccine is dried from the frozen state and vacuum-sealed by special technics.

animals over an observation period of one year. (See table 3).

Costa Rica and Guatemala. A total of 1,012 cattle, from one to ten years of age, on various farms in different sections where rabies is endemic, were vaccinated with 7.5 ml. (2½ dog doses), intramuscularly in the hind leg. (See table 3). Many of these were lactating animals. There were no reactions nor deaths reported in vaccinated animals on six-months follow-up.

Field Trials to Determine Dose, Route of Administration, and Immune Response

As the results obtained in laboratory animals indicated that protection was afforded by chick-embryo-adapted rabies vaccine against the Honduras strain of virus, and as the vaccine was proved safe in the dosage used in extensive field trials, further studies were instituted to determine dose, route of administration, and immune response. Regular production lots of vaccine, for dog immunization, were used, as a 33⅓% dilution.

It is interesting to note that out of a total of 94 serum samples collected before administration of rabies vaccine from cattle originating in the endemic areas, 68 were negative to a fixed rabies virus neutralization test in mice, eight had a titer of 1:2, and 16, more than 1:2 against more than 53 m.l.d. One would assume that these animals were bitten by infected bats but survived.

One hundred and sixty eight head of cattle between one and two years of age were vaccinated on a ranch belonging to the Standard Fruit and Steamship Company, and identified by hot-iron branding. They were divided into four groups of 42 animals each. Vaccine was administered at a single injection site, subcutaneously posterior to the shoulder in 7.5 and 15 ml. doses to each of two groups, respectively, and intramuscularly in the hind leg in 7.5 and 15 ml. doses to each of the two remaining groups. (See table 2). There was no evidence of reaction nor deaths attributable to the vaccine during the observation period.

Animals were observed for five months postvaccination, when they were confined and challenged with canine origin, rabies street virus, NYC strain. Canine origin virus was selected because the bovine origin Honduras strain produced irregular mortality in guinea pigs, which suggested a lower order of virulence. All vaccinated animals, and 41 nonvaccinated animals were inoculated five months postvaccination with 1 ml. of various dilutions of rabies virus bilaterally in the masseter muscles as indicated in table 2.

It is evident that a more satisfactory immunological response was induced by the intramuscular route of inoculation, which is in agreement with the experience in dogs[5]. While some protection was afforded by a 7.5 ml. intramuscular injection, the dose of 15 ml. of vaccine administered intramuscularly afforded the greatest degree of protection in the experiment.

Having demonstrated the immunogenic properties of the vaccine in a 15 ml. dose administered intramuscularly to cattle, against challenge with virulent street virus, extensive additional field trials to establish safety were instituted in this same area and other Central American countries.

TABLE 2. Results of Challenge Five Months Postvaccination by Injection of 1 cc. Suspension of Rabies-infected Canine Salivary Gland, Bilaterally in the Masseter Muscle, Recorded 48 Days Postchallenge

Route	Dose	Mortality Ratio of Cattle Challenged with Dilution of Street Virus				Total — Dead over Challenged
	ml.	1:20	1:40	1:80	1:160	
Subcutaneous	7.5	9/10	7/9	7/10	7/10	30/39
Subcutaneous	15.0	9/10	9/10	8/9	8/10	34/39
Intramuscular	7.5	6/11	4/9	6/11	4/10	20/41
Intramuscular	15.0	4/10	3/11	2/10	1/9	10/40
Controls		10/10	12/12	9/9	10/10	41/41

In the LaCeiba area, 992 vaccinated cattle one to six years of age were maintained on two ranches, 795 head at Esperanza and 197 at Planes, in sections separated from one another and from the locale of the original trial. Approximately half of each herd was inoculated with 15 ml. intramuscularly at one site in the hind leg, and the remainder were given 7.5 ml. in each hind leg. One animal died two days after vaccination from an unrelated cause.

All vaccinated animals were observed for 35 days after vaccination. There were no reactions nor deaths with the exception of the one noted above. There have been no deaths reported through seven months post-vaccination.

Safety of the vaccine following a second injection was demonstrated in a herd of 107 Holstein heifers, six to 18 months of age, and one Holstein bull, 30 months of age, on Monte Cristo Ranch, LaCeiba. Approximately half of the heifers and the bull received 6 ml. vaccine intramuscularly. All

animals in the herd were inoculated with 10 ml. of a 33⅓% suspension six to 18 months later. No reactions were observed during a three-months observation period.

A summary of field trials in Central American Countries is presented in table 3. A total of 6,087 animals were vaccinated. Although rabies deaths continue to occur in nonvaccinated cattle in these areas, there are no reports of rabies in the vaccinated animals regardless of the dosage schedule.

Discussion

There is an abundance of evidence indicating that rabies, both of vampire bat and dog origin, occurs frequently throughout South and Central America, Mexico, and Cuba, although the accuracy of the reports of incidence of rabies in these areas is questionable. Too frequently there is no laboratory diagnosis. It is inferred, however, that, in many countries north from Argentina, rabies is of great economic importance as a cattle disease.

Controlling the rabies vector is desirable, of course, and dog rabies can be controlled as demonstrated in the United States, by isolation, destruction of strays, and vaccination. Such a program is impossible as far as the vampire bat is concerned. While, for all practical purposes, it was possible to eliminate the bat vector in the infected areas of Trinidad, such a project cannot be undertaken in the sparsely inhabited mountainous areas of Central and South America, where transportation is confined to the horse and mule, and where the bat lives in hollow trees and caves.

Since it is not possible to rid mainland areas of the bat vector, and since night confinement of cattle in screened enclosures is impractical, a vaccination program seems to be a logical control measure to reduce to a minimum the susceptible population. Of approximately 6,000 cattle vaccinated in an endemic area, none have come down with rabies by field exposure, whereas the incidence of bat rabies has continued high in the non-vaccinates in the same area.

Summary

1. From the facts presented, it is evident that rabies vaccine modified virus avianized will protect cattle against rabies virus of bat origin and street rabies virus of canine origin.

2. A highly fatal, paralytic disease was observed in cattle in Honduras, Central America. A virus, identified as rabies, was isolated from brain tissue, and the vampire bat was suggested as the vector.

3. The Honduras strain of virus, identified by cross-protection test, was shown to be

TABLE 3. Summary of Field Trials with Rabies Vaccine Modified Virus Avianized in Cattle in Central America — July 1950-July 1952

Area	Number Animals	Age	Dose—ml. 20% susp.	Dose—ml. 33 1/3% susp.	Route	Remarks
SAFETY						
Honduras	266	Over 1	10.0		I.M.	2 rabies deaths, 4 and 15 days postvaccination, confirmed by laboratory examination. 3 deaths, 2, 3 and 5 days postvaccination, cause not determined. No reactions nor deaths in 3,811, over one-year observation period.
	3,526	yr.	6.0 or 10.0		S.C.	
	24	4 mo.	3.0		I.M.	
Costa Rica	426	Over 1 yr.		7.5	I.M.	No reactions nor deaths on 6 months follow-up.
Guatemala	586	1-10 yr.		7.5	I.M.	
DOSE, ROUTE OF ADMINISTRATION, IMMUNE RESPONSE						
Honduras	39	1-2 yr.		7.5	S.C.	
	41	"		15.0	S.C.	Challenge test—see table 2
	39	"		7.5	I.M.	
	40	"		15.0	I.M.	
	385	1-6 yr.		15.0 in one site	I.M.	
	95	"			I.M.	1 death 2 days postvaccination from unrelated cause.
	410	"		15.0 in two sites	I.M.	No reactions nor deaths on 7 months follow-up.
	102	"			I.M.	
	107	6-18 mo.	6.0	10.0	I.M.	Approximately half had received 6 ml., 6 mo. or more before. No reactions nor deaths were reported during a 3-mo. observation period.
	1	30 mo.	6.0	10.0	I.M.	
Total	6,087					

I.M.—Intramuscularly.
S.C.—Subcutaneously.

closely related immunologically to NYC canine-origin street virus.

4. A vaccination program was instituted in Honduras, Costa Rica, and Guatemala, to determine safety of avianized rabies vaccine in the bovine. A total of 4,808 cattle, from four months to ten years of age, were vaccinated, either intramuscularly or subcutaneously, with 3, 6, 7.5 or 10 ml. doses of vaccine, 20% or 33⅓% chick-embryo suspension. There were two deaths from rabies, four and 15 days post-vaccination. There were no reactions nor further deaths reported over an observation period of one year.

5. In the experiment involving 168 head, groups of cattle were immunized either subcutaneously or intramuscularly, with 7.5 or 15 ml. of 33⅓% chick-embryo suspension. On challenge five months later, it was evident that the most satisfactory immunological response was induced by one dose of 15 ml., injected intramuscularly in the hind leg.

6. In 992 head of cattle, vaccine was administered in a dose of 15 ml. intramuscularly in one site or 7.5 ml. in each hind leg. There were no reactions nor deaths through seven months observation period with the exception of one death two days postvaccination from an unrelated cause.

7. Safety of the vaccine on revaccination was demonstrated in 107 Holstein heifers and one bull, approximately half of which had been vaccinated six to 18 months previously. No reactions were observed during a three-months observation period.

8. A total of 6,087 animals were vaccinated in the course of determination of safety and field effectiveness of various dosage schedules and routes of administration of rabies vaccine modified virus avianized. Although the incidence of rabies has continued high in the non-vaccinates in the same areas, there are no reports of rabies in vaccinated animals regardless of the vaccination procedures employed.

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Influence of Protein on Milk Fever

(*Continued from page 496*)

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A New General Purpose Lubricant

HORACE T. BARRON,* D.V.M., Taylor, Texas, and
GEORGE R. BURCH,** D.V.M., New Augusta, Indiana

THE application of various preparations to lessen friction is a routine procedure by practicing veterinarians; yet, in spite of this fact, a lubricant especially designed to meet their requirements has not been available. The greatest need for this type formulation exists in obstetrical procedures. Loss of natural lubrication commonly occurs in dystocia and it is imperative that this loss be compensated before attempting delivery. Many different preparations have been used to produce lubrication in veterinary practice, and the following are a few that have been routine; (1) mineral oil, (2) soap—liquid and powdered, (3) lard, (4) flaxseed and (5) linseed oil. To be ideal, a lubricant should fulfill the following requirements:

1. It should be non-toxic to patient and clinician.

2. It should have marked lubrication properties, even in the presence of such debris as decomposition tissue fluids, blood and pus, and should retain its lubricant property for at least ten to 15 minutes after application.

3. It should be available in concentrated form, thus eliminating bulky containers.

4. It should be easily removed with water.

5. It should not deteriorate after preparation for final use on the patient.

6. It should be inexpensive.

7. It should be noninjurious to rubber materials.

8. It should be noncorrosive to instruments.

9. It should be without unpleasant odor, or odorless.

A preparation conforming to these specifications has not been available to the veterinary practitioner. Anyone having made use of oils, soaps, or other available lubricants, will readily agree.

A special formula, lubrivet,® was developed after extensive clinical use of mineral oil, soap powder, and other available lubricants had proved to be unsatisfactory in the management of difficult bovine obstetrical cases. Many of these, attended by veterinarians in the Southwest, have been in labor for protracted periods. Examination frequently reveals a dead, partially decomposed fetus, which must be delivered by traction. Adequate amounts of lubricating material must be instilled into the uterus, around the fetus, to facilitate manipula-

*Practitioner.
**Research Farm, Pitman-Moore Company.
®Pitman-Moore Company, Indianapolis, Ind.

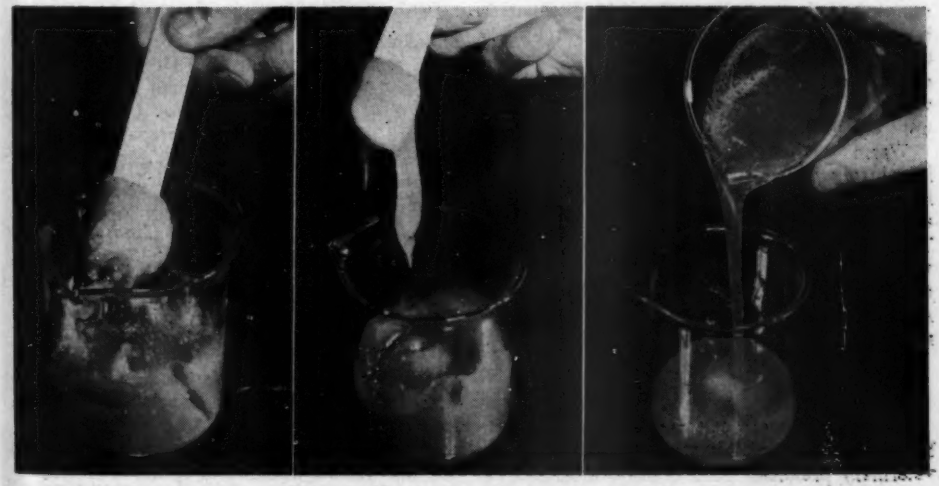

Fig. 1. Lubrivet paste concentrate (L). Addition of water makes possible preparation of any desired consistency; ointment (C), solution (R).

tion. It has also been observed, in a majority of these cases, that involution of the vulva, vagina and uterus, has progressed as far as physical limits permit, just as though the pregnancy had terminated normally. This shrunken state of the tubular organs necessitates a high degree of artificial lubrication to permit passage of the fetus. If the fetus has been dead for several hours, the fluid in the uterine cavity, if any remains, has a distinct neutralizing effect on all lubricants previously used.

Lubrivet is a paste concentrate (fig. 1) which must be diluted, with water, for use. The amount of dilution depends on the clinician and on the type of case to be treated. One jar of lubrivet concentrate will make at least 1 gal. of highly viscous solution. The diluted solution is stable indefinitely, but should be shaken prior to use.

The new product used in this clinical study was applied by three different methods: (1) A small portion, approximately ½ to 1 teaspoonful, was applied to the arms. Water was then applied to obtain the desired consistency. This method is practicable in conducting rectal and vaginal examinations; particularly, when only one animal is to be examined.

(2) A pint of diluted solution was prepared at the office and carried in the car, or kept available in the hospital, for ready use. This method was especially useful when only small quantities of lubricant were needed for such as lubrication of stomach tube, rectal palpation, retained placenta manipulations, and routine dystocia cases.

(3) A jar of the paste concentrate was added to approximately 1 gal. of water for use in problem dystocia cases. In cold weather, removal of the paste from the jar is facilitated by placing the jar in hot water for several minutes before mixing. The mixing procedure consists of slowly stirring the paste into the water, or preferably, the water into the paste, until a product of desired viscosity is obtained.

Warm water is preferred and the consistency is controlled by the clinician. If the solution is too thick, additional water may be added at any time to produce a more fluid preparation. This diluted solution easily can be introduced, with a stomach tube and pump, into the uterus to facilitate lubrication of the fetus (fig. 2). Any unused portion of the diluted solution should always be saved for future use.

Report of Clinical Use

These cases were selected to illustrate the broad usefulness of this preparation in routine veterinary practice.

Case 1. Dystocia in an Ewe. Arms well lubricated with prepared solution from pint bottle, prior to correcting lateral deviation of the head. Delivery was uneventful.

Case 2. Rectal and Vaginal Examination of Jersey Cow with Pyometra. Arms lubricated with prepared solution from pint bottle. Examination completed with ease.

Case 3. Lubrication of Stomach Tube. Applied prior to passage in horses receiving

Fig. 2. Method of instilling lubrivet into the uterus.

anthelmintic therapy. The prepared solution from pint bottle was used. Tube passed with ease and without embarrassment in any case.

Case 4. Enema Solution for Use in Dogs. A more diluted solution was prepared by mixing paste and water. The stools passed following the enema were well lubricated and evidence of toxicity was not noted.

Case 5. Rectal and Vaginal Examination in a Guernsey Heifer to Diagnose Possible Torsion of the Uterus. Used prepared solution in pint bottle to facilitate passage of hand and arm.

Case 6. Hereford Heifer Bred Accidentally to a Hereford Bull. Examination following onset of labor revealed a characteristically large Hereford calf. The anterior half of the calf passed through the vulva with moderate traction without addition of artificial lubricant.

(*Continued on page 512*)

Reduction Of Fractures Of The Distal End Of The Femur

RAYMOND J. GARBUTT,* D.V.M., New York, New York

PRIOR to the use of penicillin and other antibiotics, fractures of the distal end of the femur frequently proved difficult to manage successfully, especially when they occurred in the larger breeds of dogs. The development of antibiotics, vitalium, and stainless steel, type 18-8-SMO, have been of tremendous value and good end results are now possible in all types of fracture work, particularly the distal end of the femur.

If the fracture is at or just above the epiphyseal line, the method described and illustrated by Armistead and Lumb[1] has been employed by the writer for several years with good results, particularly in the smaller and lighter breeds of dogs and cats.

When the fractured distal end of the femur leaves a fragment of approximately ½ in. to 1½ in. above the epiphyseal line, open reduction is preferred, utilizing a vitalium nail or screw to reduce and maintain the distal fragment in proper position. In these, the powerful action of the gastrocnemius muscle draws the lower fragment backward and upward, holding it firmly in this position. The failure of board splints, plaster of Paris, and similar materials to bring into and hold the distal end of the femur in the correct alignment is because of absence of direct traction to overcome or neutralize this powerful muscle action.

While results in young, thinly muscled dogs and cats with a minor degree of separation might be reasonably satisfactory, in the majority of cases they were definitely not so.

With the use of tongs and stirrups mechanically perfect equipment was available, but both tongs and stirrups required continuous observation and adjustment.

Attempting to bridge the bone fragments by means of stainless steel pins attached to small blocks for maneuverability and adjustment gave good results in certain cases. However, bridge pinning has certain definite disadvantages. In a large percentage of cases, insertion and adjustment of pin must be made under the fluoroscope, creating a hazard to operator and assistants. While all practitioners know the dangers of *x*-ray burns, many refuse to protect their hands because fingers lose their sensitivity when encased in heavy, stiff, lead-lined gloves. Gloves are frequently discarded for expediency; the result is some practitioners are suffering from the consequences of serious *x*-ray burns.

Aside from the hazards and difficulties involved, the pinning of the distal end of the femur to its upper fragment or shaft was often far from satisfactory as the backward pull on the lower fragment frequently caused pins to loosen.

Recognition and development of stainless steel pins of formula 18-8-SMO proved successful with several types of long bone fractures. In the femur, the pins were worked through the trochanteric fossa, thus fixing the upper and lower fragments. The upper end of the pin was left out for easy removal. In some cases, the protruding pin furnished a pathway of infection to the bone. Antibiotics have done much to control this condition. In many cases, pins have been driven into the bone below the trochanteric fossa and allowed to remain in position indefinitely.

In well developed, heavy-boned and muscled

*Practitioner, and chief veterinarian and consultant to the A.S.P.C.A. Hospital, New York, N. Y.

dogs, pins have sometimes angulated or broken. Insertion of heavy gauge pins into the distal end of the femur has not always been possible because of the curvature of the medullary canal.

After some experimentation, a satisfactory

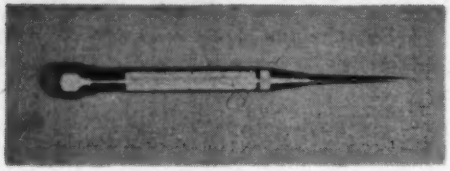

Fig. 1. Scribe may be used to pinpoint bone, thus making for easier drilling. It is also useful for simple wiring operations.

method of fixation for the distal end of the femur from ½ in. to approximately 1½ in. above the epiphyseal line was developed.

Selecting Proper Time for Surgery

The time for operating is most important. If internal injuries and shock are not present, it will prove advantageous to operate within a few hours after the injury. Waiting for the swelling to subside is contraindicated except in shock and excessive hemorrhage. Muscular contraction is minimized by early operation, and there is a substantial saving of time with minimum effort and better functional and end

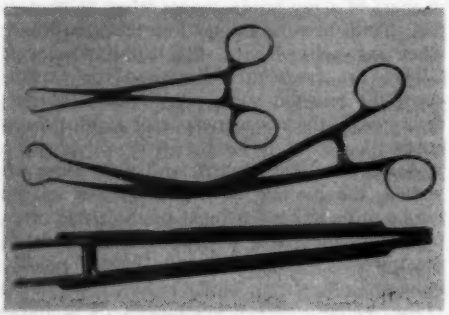

Fig. 2. Bone forceps are most useful in manipulating fragments. The spreader is essential in separating bone ends where contracted muscles are involved.

results. Nembutal is used as an anesthetic except where there is more than usual anxiety over the risk of the anesthetic or when surgery is prolonged; then ether is used to complete the operation, sometimes supplemented by intramuscular injection of demerol®[1].

X-ray negatives frequently distort length and diameter of the bone and medullary cavity. It is advisable, therefore, to select several sizes of vitalium nails and screws for sterilization. Vitalium is cast in a mold and nails and screws do not come in all lengths or thicknesses. This material is extremely hard and it is advisable to use a carborundum wheel whenever it is desired to cut the nails or screws. It is sometimes necessary to grind away a small part of the rim of the screw head for easy insertion in the medullary cavity of the upper fragment. The choice of vitalium nails or screws is optional. Nails are made thicker in diameter

Fig. 3. Vitalium screw used to reduce and fix the distal end of the femur. *X*-ray taken immediately after reduction.

and longer than the screws, and where there is sufficient bone for anchorage in the distal fragment, they may be used. There is also a slight saving in time in driving in the nails as compared to turning in the screws, but the main criterion should be the length of the distal fragment.

Screws are indicated where there is a minimum amount of bone shaft left above the epiphyseal line. The cancellous lattice-like, bony formation which forms the substance of the interior distal end of the femur provides an excellent anchorage for the coarse, deep threads of the screw. A longitudinal incision is made on the lateral surface of the leg, directly over the original or normal position of the distal end of the femur; not over the fracture site. The vastus laterallis and fascia lata are exposed and carefully cut through, using a scalpel, scissors, or divided by spreading with a strong pair of artery forceps. Opening this area should be done carefully;

[1] Winthrop-Stearns, Inc., New York, N. Y.

normally there is little danger, although occasionally the perineal nerve and blood vessels may be dislocated from their original positions due to the impact on the affected and traumatized tissue.

Fig. 4. Vitalium nail used to reduce and fix the distal end of the femur. *X*-ray taken several days after reduction.

Operative Technic

The lower fragment is located and raised upward to the skin incision. The fingers may be used to bring the distal end to the skin incision but if this is impossible, a scribe (fig. 1) should be inserted in the medullary cavity and the distal end brought upward.

Fig. 5. Vitalium screw used to reduce and fix the distal end of the femur. *X*-ray taken about six weeks after reduction.

An assistant may aid by placing the hand under the medial surface of the leg and pressing upward, flexing the tibia at the same time. Depending on the size of the distal end of the femur, forceps may be used to grasp and bring the bone into proper position for repair. (Fig. 2.) Where muscle contraction has taken place, spreaders may be used. With the epiphysis held firmly in the fingers or between forceps, a pilot hole is made in the bony substance of the distal epiphysis with the scribe. (Fig. 1.)

Fig. 6. In heavy-boned dogs with well developed muscles, where more than usual support is indicated, a stainless steel screw attached to a stainless steel tube is frequently used. These tubes work well if the femur is straight and will permit tube to turn.

The vitalium nail is then driven into the cancellous bony tissue. If a screw is used, it should be screwed into the bony tissue until it meets firm resistance. Sulfonamide powder or a mixture of antibiotic powders should be dusted into the incision. An assistant then takes the leg between the tibia and the hock

and pushes it forward, twisting the leg so as to place both fractured ends of bones together at an angle. The operator then guides the protruding part of the nail or screw to the entrance of the medullary cavity of the lower end of the upper fragment. The attendant then pulls the leg straight outward toward his body while the operator guides the nail or screw into the medullary canal. If the attachments of the patella are severed, this bone is frequently removed with apparently little or no effect on locomotion. The muscles are sutured together with interrupted catgut and the skin with mattress sutures of dermalon®[2].

Penicillin is injected once a day for four or five days, directly along the edges of the incision, and guided into the muscles around the fractured bone ends. The operation is simple to perform with a minimum of effort and with good end results.

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Streptomycin is a natural antibiotic that is not readily taken up from the digestive tract. This fact accounts for its efficacy in the control and management of enteric disorders. The antibiotic is in effective concentration for a longer time and passes to the lower bowel, reducing the number of organisms in the lumen of the entire system. — *Alexander Zeissig, D.V.M.*

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The earth's average population density is 47 persons per square mile.—*S. N. L.*

Portable Calf Pens

(Continued from page 490)

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®Davis & Geck, Inc., Brooklyn, N. Y.

General Purpose Lubricant

(Continued from page 508)

A typical calf thigh-maternal pelvis lock developed. Traction was released, and the calf was repelled slightly to admit passage of the stomach tube alongside its abdomen. One pint of thick lubrivet solution was pumped through the tube and traction was resumed. The delivery completed with surprising ease.

Comment

It should be stressed that clinical usage of lubrivet greatly assists in the management of retained placenta cases, minimizing the traumatizing effect of manual manipulation. The lubrication can, also, be used to a distinct advantage in replacing the prolapsed uterus, or vagina.

Thorough cultural procedures of the diluted solution, which had been prepared several months previously and stored in an open flask, did not reveal any bacterial growth. This study indicates that the preparation is not a suitable media for microbial growth. Rubber surgical gloves stored in the solution for six months did not deteriorate. The preparation does not produce any objectionable reaction on instruments.

Limited study does not indicate that ingredients are injurious to bovine semen. Activity of the sperm became slower as the viscosity of the preparation was increased. Lubrivet, when introduced into the uterus of a parturient animal, retained its lubricant property sufficiently long to permit normal manipulation and delivery. In extreme cases involving emphysematous decomposition of the fetus, a repetition of lubrication is required much less frequently than with other similar products.

The writers have not observed any sign of toxicity in the patients, nor to themselves. It has been found to be odorless and easily removed with water. Extensive use has revealed it to fulfill more adequately the ideal requirements of a veterinary lubricant than any other preparation used.

Summary

A general purpose lubricant, lubrivet, especially designed for the practicing veterinarian, is discussed. A report of six clinical uses is presented. This preparation adequately conforms to the ideal specifications required of a veterinary lubricant.

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The mode of action of antibiotics on weight gains in pigs, at the feed-supplement level, is unknown.

Studies Of Newcastle Disease And Canine Distemper Viruses In Puppies

REGINALD L. REAGAN,* Major, U.S.A., Ret., and
A. L. BRUECKNER,* D.V.M., College Park, Maryland

EGG-ADAPTED Newcastle disease virus (NDV) strains; California 11,914; Colorado BAI 1, 1946; Connecticut BAI 1, 1946; Delaware BAI 1, 1946; and Kentucky BAI 1, 1946, used for these studies were obtained from the Bureau of Animal Industry, U. S. Department of Agriculture, Washington, D. C. The four latter strains were isolated by Bureau workers from infected chicken tissue received from the corresponding states before the introduction of commercial live virus vaccines for Newcastle disease. The virus had been carried in ten-day embryonated chicken eggs through six serial passages when received.

In our laboratory, the strains were carried through six additional passages in ten-day embryonated chicken eggs, except in the California strain which was continued through the 24th passage. Allantoamniotic fluid from the dead eggs was harvested and pooled separately for each strain. All strains of the virus were confirmed to be NDV by neutralization tests conducted in ten-day embryonated chicken eggs. The tests conformed to the procedure recommended by the BAI[1]. Newcastle immune chicken serum neutralized the virus in all cases while normal chicken serum had no effect.

Lots of embryonated eggs were injected with the virus of the respective strains. Two cc. of pooled infected allantoamniotic fluid from embryonated eggs for each strain were injected intracerebrally into groups of two mongrel puppies (six weeks of age). The injection was made into the right frontal lobe. Allantoamniotic fluid pooled from eggs of the 27th embryo passage of NDV, California strain 11,914, was injected intramuscularly into a group of eight puppies for a period of ten days until a total of 5 cc. had been given.

Twenty-five days after the intracerebral inoculation of virus from the various strains and 15 days after the final intramuscular injection of the California strain, all of the dogs were bled by cardiac puncture. The sera were tested for neutralizing antibodies for Newcastle disease. These results are given in table 1. No dogs showed evidence of Newcastle disease symptoms from the intracerebral or the intramuscular injections.

TABLE 1. Results of Neutralization Tests

Strain	Dogs	Amt.	Route	Results
Calif.	1	2 cc.	I.C.	1,000 e.m.l.d.
	2	2 cc.	"	10,000 e.m.l.d.
Colo.	1	2 cc.	"	1 e.m.l.d.
	2	2 cc.	"	1 e.m.l.d.
Del.	1	2 cc.	"	1 e.m.l.d.
	2	2 cc.	"	1 e.m.l.d.
Conn.	1	2 cc.	"	0 e.m.l.d.
	2	2 cc.	"	1 e.m.l.d.
Ky.	1	2 cc.	"	1 e.m.l.d.
	2	2 cc.	"	0 e.m.l.d.
Calif.	1	5 cc.	I.M.	1,000 e.m.l.d.
	2	5 cc.	"	10,000 e.m.l.d.
	3	5 cc.	"	1,000 e.m.l.d.
	4	5 cc.	"	1,000 e.m.l.d.
	5	5 cc.	"	100,000 e.m.l.d.
	6	5 cc.	"	10,000 e.m.l.d.
	7	5 cc.	"	10,000 e.m.l.d.
	8	5 cc.	"	100 e.m.l.d.
Contact controls	1	No Newcastle virus		0 em.l.d.
	2	"	" "	0 e.m.l.d.
	3	"	" "	

e.m.l.d.—embryo minimum lethal dose
I.C.—intracerebral
I.M.—intramuscular

Thirty-six days after intracerebral inoculation and 26 days after the final intramuscular injection, each of the dogs was given 10 mg. (0.5 cc.) of Lederle distemper virus serial number 6362-37 A and 6364-47. At this time six dogs which had not been exposed to Newcastle virus and three which had been contact controls with the group injected intramuscularly were each given 10 mg. (0.5 cc.) of the same virus.

Temperatures were recorded daily for 16 days on all dogs, beginning five days following challenge. Results of the challenge and the minimum and maximum temperatures are given in table 2.

During the course of the experiment seven puppies died of malnutrition in the injected and contact control groups. Change in the feeding regimen about the time of challenge

*Maryland State Board of Agriculture, Live Stock Sanitary Service Laboratory, University of Maryland.

prevented further losses of this nature. Puppies which succumbed to malnutrition are excluded from table 2.

TABLE 2. Results in Dogs Injected with NDV and Challenged with Distemper Virus

Dog	Strain of NDV	Method of injection	Min. temp.	Max. temp.	Result after challenge
1	Calif.	I.C.	102.6	103.8	survived
2	"	"	101.3	104.3	"
1	Colo.	I.C.	102.0	103.4	"
1	Conn.	I.C.	102.0	103.5	"
1	Del.	I.C.	102.0	103.8	"
2	"	"	103.4	103.6	died 9th day —distemper
1	Ky.	I.C.	101.8	104.2	survived
2	"	"	102.4	103.6	died 15th day —distemper
5	Calif	I.M.	101.2	102.3	survived
6	"	"	101.8	103.0	"
7	"	"	102.5	103.6	died 15th day —distemper
8	"	"	101.0	103.0	survived
1	—	Normal cont.	101.0	103.1	died 23rd day —distemper
2	—	" "	102.0	103.8	survived
3	—	" "	101.8	104.4	"
4	—	" "	101.8	103.6	died 15th day —distemper
5	—	" "	101.6	103.8	survived
6	—	" "	102.0	104.0	"
1	—	Contact cont.	103.7	104.0	died 9th day —distemper
2	—	" "	103.4	104.2	died 9th day —distemper

I.C.—intracerebral
I.M.—intramuscular

Discussion

The distemper mortality rate in the puppies not injected with Newcastle disease virus was 50%. The distemper mortality rate in the puppies which had been injected with Newcastle disease virus by the intracerebral or intramuscular methods was 25%. The small number of animals on experiment and the normal variability in susceptibility of the canine species to experimental challenge with canine distemper virus preclude the drawing of conclusions concerning the resistance in the Newcastle disease virus injected puppies.

Summary

Dogs inoculated intracerebrally with allantoamniotic fluid containing egg-adapted NDV (California, Colorado, Delaware, Kentucky, and Connecticut strains) showed no clinical symptoms of Newcastle disease. Dogs injected with the California strain developed neutralizing antibodies. Dogs injected intramuscularly with California strain NDV showed no clinical symptoms of infection. Neutralizing antibodies against the specific virus developed.

Following distemper challenge, one puppy in the Delaware strain group, one puppy in the Kentucky strain group, one puppy in the subcutaneous California strain group, two puppies in the contact control group, and two puppies in the normal control group died of distemper at intervals of from nine to 23 days. Clinical symptoms and autopsy findings confirmed this diagnosis.

REFERENCES

1. USDA Bul., The Diagnosis of Newcastle Disease. August 15, 1946.

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XVth International Veterinary Congress, Stockholm, Sweden, August 9-15, 1953

The United States Committee on the XVth International Veterinary Congress has announced that the Organizing Committee has accepted 30 proposals for speakers and subjects from the United States. These include subjects and speakers submitted by the United States Committee last summer, with others suggested by interested individuals. Some places are yet to be filled. The Organizing Committee of the Congress will prepare and distribute final schedule of program.

Preliminary tour and travel arrangements are announced by the Travel Service Bureau, Inc. Besides a basic tour to include visits to points in England, Scotland, Norway, Sweden, Denmark, Belgium and France, two extended schedules are announced; one to Switzerland and one to Italy. A short tour is also offered. All-costs tours, based on first class trans-Atlantic travel, range from $1,199. for the short tour to $1,577. and up for the basic tour plus Italian extension. All will embark from Montreal immediately after the close of the A.V.M.A. meeting in Toronto, Ontario, Canada.

The importance of making reservations early has been emphasized by those who have been selected by the sub-committee to handle details for the tour. Trans-Atlantic travel during 1953 is expected to exceed any previous year because of coronation ceremonies in England. Those interested are urged not to delay their request for explanatory brochure. Address Travel Service Bureau, Inc., Brookline 46, Mass.

EDITORIAL COMMENTS

Veterinary Headlines During 1952 Suggest the Need for More Disease Control Information

Year end is a time for retrospection.

Man's fight against animal diseases continues to be a desperate struggle. Encouraging progress during the year past is evident though happenings have in some instances defied efforts to minimize losses. New and improved ways and means have been insufficient as protective barriers. In spite of progress in the form of new concepts, methods, and therapeutic agents, inroads of disease and parasitism have been significant. There are laurels to be handed out, but too few to rest upon.

Accomplishments are the measure of progress, and much must be learned, much must be done to reduce the limitations that diseases of all kinds impose on profitable animal husbandry.

During the past year, serious outbreaks of disease among meat animals have occurred in widely scattered sections of the country. By intensive effort, effective control, treatment, and preventive measures have been evolved. In other cases, measures previously highly held had to be adjusted to fit the situation in a changing pattern. The constant factor was evidence of change.

Research and investigation have continued in increased tempo. Volume of this work is not reassuring. Two points stand out: (1) Many diseases need research for better understanding of processes and methods of control and treatment; and (2) expenditures for research are now insufficient and too small in consideration of the value of the livestock industry or to cope with pyramiding problems.

Vesicular Exanthema in Swine

The year 1952 will be an unforgettable one because of the rapid spread of vesicular exanthema among swine. In a matter of weeks, this disease spread from California, where it has existed for 20 years, across the entire length and breadth of the country. Over one-half the states experienced outbreaks during the period midsummer to fall. (See *Vet. Med.*, 47:353 [Sept.], 1952.)

Hogs fed raw garbage were most often affected, but not all disease occurred among this group. Indirect exposure was responsible for some disease. It attacked animals used for the production of hog cholera antiserum, seriously jeopardizing the supply of this agent which conceivably might expose swine culture to a flank attack of hog cholera.

Vesicular exanthema has been far-reaching from angles other than those of mortality of swine. Raw garbage feeding and sanitary disposal of food waste have come under scrutiny. Some disagreeable truths have been revealed. Damage has been other than loss due to holding swine in feed lots, loss due to restrictions and quarantines, condemnations, etc.; publicity has unfavorably influenced the consumption of pork products. Some growers are restricting swine breeding activities because they fear the contagion might strike their droves. All of these things affect veterinary practice.

Anthrax

The incidence of anthrax reported from many areas previously free of this infection has been the concern of livestock officials in every major livestock-producing area. The tremendous increase in the number of outbreaks, as determined by incomplete reports covering the first eight months of 1952, was due principally to widespread occurrence in swine in the Midwest and in cattle in Kansas, New Jersey, and Florida. (See *Vet. Med.*, 47:274 [July], 1952 and 47:315 [Aug.], 1952.)

There are some limited areas in which anthrax occurs annually. Vaccination procedures are routine and losses thus minimized. The soil in these areas is considered to have been seeded with infective spores. In those areas where the disease has occurred as a new infection, consumption of contaminated feed has been shown to be the source of infection. Here again is evidence of change. Outbreaks among swine were characterized by some unusual aspects. Mortality rate was low due to prompt treatment, the disease did not spread from animal to animal nor to other species on the same premises. The efficacy of antibiotics and hyperimmune serum for treatment was demonstrated. Not the least consideration in regard to this ageless disease is its public health significance. Official reports place the incidence of anthrax in man in the United States as 508 cases during the seven-year period, 1944 to 1951.

Atrophic Rhinitis

Atrophic rhinitis, an Old World malady of swine recognized as a disease entity for over a century, poses a major threat to the purebred swine industry. Wherever livestock men congregated in 1952, one heard repeated by growers throughout the great Midwest that breeding operations were being temporarily suspended because of this disease. The disorder is not confined to the Corn Belt.

The disease is known to be widespread. Admittedly, exact information is lacking on this point. However, limited surveys indicate the serious proportions of infected droves.

Foot-and-Mouth Disease

The almost world-wide distribution of foot-and-mouth disease made repeated headlines in 1952. Readers of VETERINARY MEDICINE have been acquainted with the epizootic in western Europe, numerous serious outbreaks in England, the story of the spread of infection in Canada and the valiant and successful fight to stamp it out in the Dominion to the north. Highlighting all of these stories was the announcement of the project for development of research facilities on an isolated island (Plum Island) that promises added information so vital to effort to prevent its establishment here. (See *Vet. Med.*, 47:381 [Sept.], 1952.)

After six years, the international border between Mexico and the United States was opened on September 1, 1952. In Mexico, problems presented were gigantic yet successfully concluded. The threat of introduction of foot-and-mouth disease from that direction has been largely eliminated.

Other Disease

Developments concerning many other diseases of livestock and pet animals have made news in 1952. To mention a few: Rabies continues to pose a significant problem from both a veterinary and public health aspect. Public apathy is blamed. Brucellosis eradication has developed around plans for vaccination of calves and elimination of infected animals. Some continue to question the advisability of procedures pursued in some states. Infection in swine may have a limiting influence on eradication in cattle. New hog cholera immunizing agents have been under extensive field test and trial. Further reports can be expected.

Bovine hyperkeratosis, air sac infection of poultry, Q fever in dairy cows, bovine leptospirosis, canine infectious hepatitis, and others have been discussed in 1952. Investigations on some of these have been fruitful; for others, only limited progress can be cited. Authorities recognize a vital need for more study and information on many disease problems that now limit profits to growers and the supply of meat.

New Therapeutic Agents

Space does not permit a review of all significant augmentations to the list of therapeutic agents developed from research and experience. To say these have developed in crescendo appears to understate the fact. The veterinary practitioner is better armed than ever before. The specificity of certain useful biological agents, drugs and antibiotics has been strengthened.

Miscellany

The molding of the veterinary profession as an integral part of public health work and civil defense attests to advancement and recognition by allied professions of the part veterinarians are qualified to play.

Research grants and accomplishments of veterinary specialists have made possible some forward steps.

New facilities for training veterinarians and for conducting animal disease study give assurances of better understanding. Enrollment in the veterinary curriculum of 17 schools in the United States and two in Canada offers the prospect that youth and energy will continue as a bright spot in veterinary professional fields.

Telecasting as a means of demonstrating procedures to large groups has proved valuable.

In the final analysis, from a quick resume of 1952 headlines, one finds prideful accomplishment, yet is appalled at unexpected events. There is a realization of the necessity for alertness, yet assurances in the promise of a new year.

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Most of the newly infected area quarantined for vesicular exanthema in swine has been on premises where hogs are garbage-fed. Garbage collected in urban areas continues to be judged the primary reason for spread of the disease. Further new outbreaks may be expected almost anywhere swine are fed raw garbage or packinghouse refuse. It is well to keep in mind that farm kitchen garbage may contain infected pork scraps on those farms where fresh pork is purchased in the town butcher shops. Such kitchen waste should not be fed farm pigs unless cooked.

Propose Legislation to Regulate Garbage Feeding

Vesicular exanthema, trichinosis, and other swine diseases will be attacked through a cooperative plan being developed by the U. S. Department of Agriculture and the Public Health Service of the Federal Security Agency.

Vesicular exanthema has affected thousands of hogs in 27 states in the past few weeks, and slaughter programs have been carried out in 14 states. In at least 12 states, all infected hogs have been slaughtered. Trichinosis is one of the most widespread of human diseases in the United States. Both are spread largely by the commercial feeding of raw garbage to swine.

The plan for joint action was developed between Clarence J. McCormick, Under Secretary of Agriculture, and John L. Thurston, Deputy Federal Security Administrator.

Mr. McCormick pointed out that the Department of Agriculture had declared an emergency on August 1 because of "the widespread dissemination of a virus disease of swine known as vesicular exanthema." He cited the experience in California to the effect that "the feeding of raw garbage is one of the most important factors" in the spread of the virus, and that "the cooking of garbage used as hog feed would be a most important step toward control and final elimination of the disease."

Mr. McCormick called attention to the Interstate Quarantine Regulations which are enforced by the Public Health Service and which include the requirement that garbage transported interstate for swine-feeding purposes receive heat treatment. He expressed a hope that the Public Health Service would place emphasis on the enforcement of the regulation, and also would "take appropriate steps to stimulate state health authorities to obtain legislation, if necessary, to prohibit the feeding of raw garbage to swine."

Mr. Thurston stated that "the Public Health Service for years has been advocating heat treatment for garbage used as swine feed," in the interest of controlling trichinosis, which has greater public health significance than vesicular exanthema, although heat treatment would help greatly to stamp out both, as well as other swine diseases.

"We are in full agreement," Mr. Thurston declared, "that it is most important to curtail the practice of feeding raw garbage to swine," and Public Health Service regional offices were specifically requested on August 7 "to enforce section 72.23 of the Interstate Quarantine Regulations as vigilantly as possible." He said, also, that "State health authorities have been informed of the dangers to public health inherent in this situation, and have been urged to work with the state departments of agriculture for the advancement of programs to bring about disinfection of all garbage fed to hogs.

"While limited to a considerable extent by the inadequacy of funds available for inspection and enforcement work," Mr. Thurston said, "I can assure you that the Public Health Service and the states will collaborate to the fullest extent possible with the Department of Agriculture in carrying out these measures."

Legislative restrictions concerning the feeding of raw garbage will tend to eliminate many now engaged in this type of pork production. This poses an additional problem of garbage disposal and stream pollution. Some states have already passed laws governing movement of garbage-fed swine that present problems to serum producers. Dangers inherent in this regard are apparent. It is short-sighted planning to impose such restrictions as will seriously limit serum production. Unless thoughtful application is made of police powers, the threat of vesicular exanthema to the swine industry may be removed only at the expense of unnecessary exposure to another disease.

In the main, it is believed that the requirement that garbage be cooked before being fed is advisable. However, supplies of hog cholera antiserum must not be allowed to depreciate to a possible danger point. Serum producers must be given opportunity to develop practical methods of production that are not dependent upon the supply of suitable garbage-fed swine.

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It is expected that further research will develop less costly methods, short cuts, and efficient means for the mass production of cortisone. In this event, it will be economically feasible to use this synthetic hormone for relief of symptoms in some metabolic disturbances, as a restorative, to reduce postoperative shock, in a number of anomalies of the eyes, and in other conditions.—*Alexander Zeissig, D.V.M.*

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Public releases have been issued reporting successful cultivation of the Lansing strain of poliomyelitis virus on the chorioallantoic membrane of chick embryo. It is anticipated that immunity tests will demonstrate protective antibodies against all three strains of virus common in the United States.

Scrapie, a New Disease in the United States, Diagnosed in California Sheep

Dr. Arthur G. Boyd, Division of Animal Industry, California State Department of Agriculture, reported that the diagnosis of scrapie in sheep had been confirmed in California. This report was made during the final session of the United States Livestock Sanitary Association annual meeting held in Louisville, Ky., October 28-31, 1952. Doctor Boyd supplemented his remarks with a short, untitled motion picture film.

On the basis of this report, the U.S.L.S.A. took action requesting the Secretary of Agriculture to take steps to eradicate the disease by slaughter of infected and exposed animals and payment of indemnity. A state of emergency was proclaimed immediately, which will permit the Department to take aggressive measures in cooperation with state authorities toward prompt eradication. Details of the program will be announced later.

Scrapie, an infectious virus disease of sheep and goats, has caused serious losses in Great Britain for 200 years. This is the first reported occurrence (only four head have exhibited symptoms) in the United States. Outbreaks in Australia and Canada have been controlled by slaughter campaigns. It was first diagnosed in Canada in 1945, appeared again in July 1951 and in August 1952.

According to Newsom,[1] the disease is characterized by an intense pruritus, progressive incoordination, weakness, paralysis, and death. It has been demonstrated to be caused by a filter-passing agent. Incubation period is usually long and varies from 11 to 22 months or longer.

Symptoms of the disease are suggestive of a central nerve disturbance. Head is held high, peculiar lip movements may occur, animals manifest continuous itching of the skin and tend to rub themselves on any stationary object such as a post, fences, etc. Disease progress is slow. Tremors and grinding of teeth may be observed. There is no loss of appetite nor elevation of temperature. Incoordination, excitement, coma, and death follow in succession. Some affected animals may recover.

Microscopic lesions reported are diagnostic. Vacuolation of nerve cells of the medulla is most characteristic. Methods of transmission, control, or treatment are unknown.

[1]Newsom, I. E., Sheep Diseases, Baltimore, The Williams & Wilkins Co., 1952, p. 120.

Vesicular Stomatitis*

In a letter to the Secretary of War, Civil War General George Brinton McClelland gave a description of a disease among horses in his command which fits vesicular stomatitis. His military failures may be partially ascribed to disease-ravaged mounts, artillery horses, and animals of the wagon trains.

This disease has been confused with mycotic or aphthous stomatitis on the basis of symptoms alone. Vesiculation may not be observed because of the rapidity with which vesicles form and rupture. There is similarity of symptoms in these diseases after the distinctive lesions have passed. Under conditions of artificial exposure by tongue scarification, animals often develop fever in as short a time as 20 hours and vesicles may form within a matter of a few hours thereafter; so that they may form and rupture within less than six hours. Veterinarians rarely see vesicles because they are usually called too late in the disease course.

Symptoms observed are excessive salivation, soreness and pain evident on opening the mouth, and raw, red, bleeding lesions on the tongue, buccal mucosa, dental pad in cows, interdental spaces, lips, and hard palate. An appreciable number of cases in cattle may exhibit lesions on the teats. Lameness, with lesions on the coronary band and interdigital spaces, may be observed in both cattle and swine. Animals refuse to eat or even drink in some instances. Healing is slow. Return to normal flesh required more than a month in the Wisconsin outbreak and return of milk flow in dairy cows was not achieved during the lactation period in which the illness occurred.

Incidence of infection was higher in pastured animals than in stabled groups. It ranged from 5 to 90% in the Wisconsin outbreak, averaging approximately 30% in infected herds. Calves under one year of age rarely contracted the malady. There was no continuity of spread from one affected herd to herds on adjoining farms. Investigations regarding the virus agent responsible suggest that an insect vector, or vectors, is involved in disease transmission between herds. Extensive research by Dr. R. P. Hanson has also suggested the probability of a mammalian host reservoir. Identification of insect vectors or reservoir host have not been made.

*Abstract of paper presented by Dr. S. H. McNutt, Department of Veterinary Science, University of Wisconsin, Madison, at the Eighth Annual Short Course for Veterinarians, Georgia Coastal Plains Experiment Station, Tifton, Oct. 13, 1952.

Under no circumstances should one attempt to diagnose vesicular stomatitis on the basis of clinical signs alone. Animals suspected of any vesicular disease should be quarantined promptly in an attempt to prevent spread of the infection. Treatment is symptomatic. This disease also has been shown recently to have public health significance. Man is susceptible, the disease having been reported among those who have handled diseased stock.

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Dr. S. H. McNutt states that he has never seen a case of Aujeszky's disease (pseudorabies, mad-itch) in cattle which were not in contact with swine, nor has he failed to prevent further spread of the disease in cattle herds by merely removing the hogs. He adds that it would be foolhardy to state categorically that cattle could not contract this disease except from hogs.

Nobel Prize to American Antibiotic Researcher

The 1952 Nobel prize in medicine and physiology was awarded to Dr. Selman A. Waksman, Rutgers University, discoverer of streptomycin and other less well known antibiotics. Swedish King Gustav will make the presentation on December 10, 1952.

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A vaccine for the prevention of vesicular exanthema might result from a long-time research program, according to Dr. R. E. Duckworth, California assistant state director of agriculture. Doctor Duckworth is quoted in a recent release on his report to the State Board of Agriculture: "If the disease is to be eradicated, by the slaughter method, it is believed that the cooking of garbage fed to swine will be necessary."

New Facilities at Michigan Now Occupied

Giltner Hall, named in honor of the late Dean Ward Giltner, has been put into full use this fall at Michigan State College.

Constructed at a cost of $2,400,000., this huge building will house many of the activities of the School of Veterinary Medicine, as well as providing facilities for research and graduate studies.

The new building includes the modernized veterinary clinic (extreme right in photograph) and the anatomy building (left). A new connecting structure (center) makes the whole an essentially new and modern structure. Approximately 232,000 sq. ft., or about five acres, of floor space are provided. Only the field house and auditorium on the campus exceed this building in size. Included are 60 teaching and research laboratories, five operating rooms, specially designed quarters for *x*-ray treatment and research, besides many other essential elements. Large animal clinic capacity has been increased from 38 to 80 head.

Dean C. F. Clark is quoted as stating that the investment by the people of Michigan in these new facilities will be repaid a hundredfold not only in increased earnings from animal industries operating in the state, but from the health of animal-man standpoint. It will make possible better correlation of veterinary medicine and related sciences under one roof and will be one of the nation's finest centers for training students of veterinary medicine.

Giltner Hall, School of Veterinary Medicine, Michigan State College, East Lansing, will provide modern facilities for teaching and research.

PRINCIPLES OF ANIMAL HEALTH

R. R. DYKSTRA, D.V.M.
Manhattan, Kansas

Public Demands Meat from Disease-free Animals

More and more it is being impressed, and favorably received, that in order to have comparative freedom from disease in garbage-fed hogs, the garbage must be sterilized by heat for 30 minutes at 160 F. Veterinarians have advocated this for many years in the prevention of hog cholera, trichinosis, and other diseases. Only recently the widespread outbreak of vesicular exanthema (it is probably largely spread by the feeding of uncooked garbage) has dramatized the dangers of feeding raw garbage. The feeder of corn and other grains to swine has not taken enough interest in this matter as his hogs raised on clean feeds have not suffered. Indirectly the market price of all hogs, corn-fed and garbage-fed, is reduced by publicity given to the diseases of the garbage-fed animal. The public does not like the idea of eating pork from previously diseased hogs.

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The large scale raising of pigs has now reached the point where some operators permit the newly born creatures to nurse the sow for the first two days of extra-uterine life so as to have their resistance to disease fortified by the ingestion of the highly desirable colostrum. Then they are placed in wire battery brooders and fed on synthetic milk. Forty pigs can be placed in a brooder 2 x 7 ft. in size; heated by electricity. At four weeks of age, pigs are placed in larger brooders for two additional weeks. One of the antibiotics, either terramycin or aureomycin, is added to the synthetic feed for more rapid growth; also lard if the synthetic is otherwise fat-free. This method of pig raising (the feed is from troughs, no nipples) is said to be sanitary, overcomes the insufficient teat problem, and the sows can be rebred in from ten to 14 days after farrowing.

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An inquirer wrote us about the strength of solution of hexachloride (BHC) to be used in the attempted control of ox warbles. We informed him that BHC is not effective against this parasite. Rotenone wash is still the best known agent and its use is recommended.

Brucellosis in Sheep

A correspondent recently asked our advice regarding the handling of brucellosis in sheep. Our answer, derived from current literature, was that in sheep the disease is generally considered to be self-limiting, but that if the infection has been introduced into a flock for the first time, it is urged that infected and exposed animals be slaughtered, or at least, be segregated. Since the question was raised, we informed the inquirer that strain 19 vaccine has not been demonstrated to be of value in the handling of this disease in either sheep or goats.

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Intravenous sulfonamides for foot-rot in cattle continue to be effective provided local treatment is not neglected.

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In man, according to Sodeman and Jung, (*Jour. Am. Med. Assn.*, Jan. 26, 1952), the treatment of infestation with *Taenia saginata* by means of quinacrine hydrochloride (atabrine dihydrochloride) was effective in ten patients on initial trial, and on the 11th when treatment was repeated. Post-treatment purgation, in addition to emptying the digestive tract before treatment, with castor oil or magnesium sulfate was part of the method of handling. The atabrine was administered in five minute divided doses until the maximum amount had been administered. Nausea and vomiting were toxic reactions in some patients. The treatment in all except one patient resulted in the elimination of the entire parasite; in the one exception, the worm was fragmented on passage.

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In attempts to increase mammary secretion in the dairy breeds by the use of hormones; thyroxine, especially protamines, iodinated proteins, etc.; researchers are making headway. In some instances, results seem encouraging. Best results are obtained when these elements are fed toward the latter stages of the gestation period when lactation is on the downgrade. One point seems well established. In attempts to stimulate milk flow during the period of rapid growth of the fetus, the animal must have more feed; otherwise milk is produced at the expense of body tissue and thus weight loss is the result.

POULTRY PRACTICE PROBLEMS

W. R. HINSHAW, D.V.M., Ph.D.
Frederick, Maryland

Infectious Bronchitis Eradicated by Depopulations

An excellent example of a disease prevention program embodying the principles of good management is the successful eradication of infectious bronchitis as related by Dr. Berley Winton, Director, Regional Poultry Research Laboratory, East Lansing, Mich., (*Am. Hatchery News*, 27:37, [July], 1952). For 11 year, chickens at this laboratory remained free of all infectious diseases except coccidiosis and lymphomatosis. Research on the latter disease is the primary function of the Laboratory.

This record was interrupted in May 1950 when an outbreak of infectious bronchitis occurred, and spread throughout the plant. After a mortality of 16% and a marked drop in egg production, losses ceased. Since the breeding flock for this research plant was vital to its continuation, a modified plan, involving use of eggs from the recovered flock for replacements and final disposal of the flock, was effected.

A new breeding house unit was constructed and all the prospective breeding chickens which had recovered from the disease were transferred to it. All the remainder of the chickens were sacrificed, the premises thoroughly cleaned and disinfected, and old housing and laboratory units remodeled to make quarantine and prevention in the future more feasible. This program included modern clothing change and locker rooms for the employees so that all outer clothing and shoes could be changed and hands washed before going into the plant and again on leaving it. While working in the plant, the employees now wear clean clothing furnished by the Laboratory.

Eggs from the isolated, recovered breeders were dipped in a chemical disinfectant as they were removed from the laying houses, and again when taken into the incubator room. All chicks that hatched were brooded in isolated brooders with no contact with the breeding flocks. When the hatching season was over, the breeding flock was sacrificed and the premises used for it thoroughly cleaned and disinfected.

The success of the plan is shown by the fact that the chicks which were hatched during the 1951 hatching season from the survivors of the infectious bronchitis outbreak, are now over a year old and no cases of the disease have appeared on the premises. By this procedure valuable lines of birds which have been obtained by years of selective breeding for resistance or susceptibility to lymphomatosis were salvaged. Furthermore, a flock of chickens which is free of other infectious diseases is re-established, a factor essential in such a research program.

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Antibiotics and Egg Production

The growth-promoting properties of antibiotics for young chickens and turkeys have been well established (*Vet. Med.*, 46:369 and 500, 1951). There is also considerable evidence that their value does not extend beyond the first few weeks of the growing period. Effect on the mature bird and especially on egg production and hatchability has not been adequately investigated. Evidence presented by Berg, *et al.*, (Wash. Agr. Exp. Sta. Bul. 534, May 1952) indicates that terramycin and aureomycin, at rates varying from 4 to 15 p.p.m. of the rations, does not influence rate of lay, body weight, feed consumption, egg weight, egg quality, and hatchability of fertile eggs of White Leghorn pullets. Elam, *et al.*, (*Proc. Soc. Exp. Biol. & Med.*, 77:209, 1951) using 33 p.p.m. of penicillin obtained an increase from 38 to 50% in rate of lay over a 12-week period. Berg, *et al.*, suggest the following possible reasons for the Elam, *et al.*, results being in variance with theirs: (a) to the use of a different antibiotic; (b) to the difference in dietary concentration—33 p.p.m. *vs.* a maximum of 15 p.p.m.; (c) to the basal diets used; and (d) to the "normal" production rates of the controls of the two experiments, *i.e.*, 38% in the Elam and 68% in the Berg trials.

It is evident from these two reports that one should not at the present time advise poultrymen to add antibiotics to the feed for laying chickens. McGinnis (*Vet. Med.*, 46:369, 1951) also reported that antibiotics have no influence on egg production and hatchability of eggs laid by healthy turkey hens.

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Painting black roofs of poultry houses with aluminum or white paint will reduce the inside summer temperature as much as 10 degrees F. according to G. T. Klein of the University of Massachusetts.

ABSTRACTS OF LITERATURE

Carbohydrate Metabolism and the Stress Diseases[33]

Facts have been rather well established that brain tissue depends on circulating carbohydrates, glucose in the blood, as its sole source of energy. Glycogen is not stored in nervous tissue. It follows, therefore, that nervous symptoms are evident whenever blood glucose levels fall below normal. These nervous manifestations are in direct proportion to the degree of hypoglycemia resulting from starvation or other causes. If the abnormal state of low blood sugar is extended, permanent damage to the nervous system may develop.

Ruminants, as well as animals having simple stomachs, take in carbohydrates as starches, complex sugars, and dextrins. Digestion, through action of enzymes, breaks down these compounds by hydrolysis, after which they are absorbed mainly as glucose. In ruminants, bacterial action changes cellulose to products serving as sources of energy, if not ultimately to glucose.

Carbohydrates perform many functions after absorption. They provide energy on oxidation. They are stored in various tissues of the body including, of course, the liver and muscles. A portion may be stored ultimately as fat. The author points out that this storage of glycogen is insufficient for extended periods. In fact, only that stored in the liver may be made available and that may be depleted in as little as six to 12 hours of starvation. Gluconeogenesis, or the process of providing sugar from proteins, is of vital importance. Factors of stress that may tend to imbalance the complicated control system governing gluconeogenesis may be concluded to influence blood sugar levels.

Pituitary and adrenal insufficiencies because of failure to adapt to stress factors, as explained by Selye of Montreal, have been suggested as responsible for bovine ketosis. Shaw and coworkers in Maryland have enlarged the field of research on this metabolic disorder in experiments on the use of cortisone as a therapeutic agent. Their results have been impressive and it would appear that cortisone and ACTH could prove to be valuable adjuncts to intravenous glucose therapy for handling ketosis in cows when an adequate supply of these agents becomes available at costs which are not prohibitive.

[33]Sampson, Jesse, Carbohydrate Metabolism and the Stress Diseases. *Vet. Sci. News*, 6:18 (Oct. 15), 1952.

Therapeutic Agents against *Fasciola hepatica*

There are two requirements which new, effective therapeutic agents against *Fasciola hepatica* must fulfill: (1) They should be eliminated unaltered through the bile. (2) They should be nontoxic for cattle and sheep.

An investigation of 22 drugs[32] known to be eliminated through the bile, were examined at the Veterinary College of Vienna. Of these, two substances, hydroxyquinoline sulfate (nontoxic) and desoxycholic acid (toxic) were found to be more effective than eosine and fluorescein. As effective as the last-mentioned substances are sodium iodide, sulfamethazine, congo red, and phenol red, all of which are of low toxicity.—*R. S.*

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Hormone Influence on Growth and Carcass Quality of Lambs

Controlled experiments indicate that implantation of hormones is followed by favorable responses in feeder lambs[33]. In these tests, lambs which were treated by the implantation of a 25 mg. pellet of stilbestrol and a 250 mg. pellet of progesterone at five months of age responded by an increase in rate of gain of 0.11 lb. daily. Furthermore, the treatment decreased the amount of feed required per unit of gain.

Treated lambs dressed higher and produced a higher grade of carcass. These averaged 10 lb. heavier than controls at the end of an 89-day feeding period.

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Rat Can Transmit Brucellosis to Cattle

Laboratory experiments[34] proved that the rat is capable of transmitting brucellosis to cattle. After ingestion, microorganisms are excreted with the urine. This method of transmitting brucellosis is of special importance where barns are built close together and where the sanitary standards are low.—*R. S.*

[32]Lienert, E., and Mathois, H., Pruefung weiterer, mit der Galle ausscheidbare Arzneimittel auf Leberegelwirksamkeit. *Wien. Tierärztl. Monatsschr.*, 39:344, 1952.

[33]Galloway, J. H., Bratzler, L. J., Blakeslee, L. H., and Meites, J., Effects of Stilbestrol-Progesterone Implants on the Growth and Carcass Quality of Lambs. *Mich. Agr. Exp. Sta., Quarterly Bul.*, 35:68 (Aug.), 1952.

[34]Schaetz, Fr., and Buss, W., Ist eine Uebertragung der Brucellose (Abortus Bang) auf Rinder durch Ratten moeglich? *Die Veterinarmed.*, 4:194, 1951, from *M.f.pr.Thk.*, 3:136, 1951.

Equine Lymphangitis: A Case Report

E. R. HINSHAW, D.V.M., Buckeye, Arizona

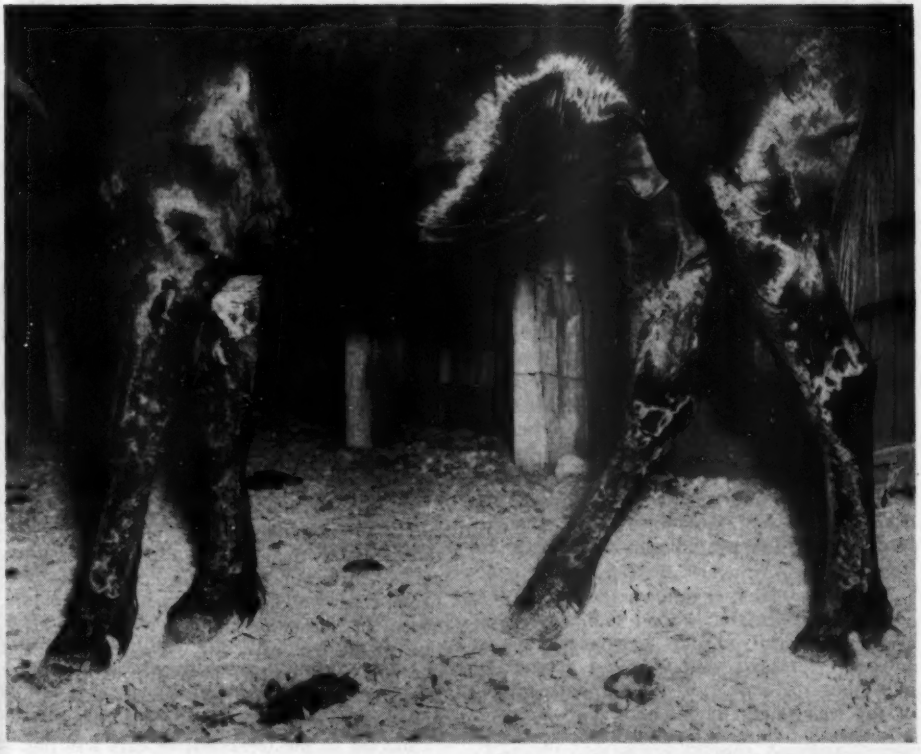
Following a routine call to a ranch in southeastern Arizona, the writer was asked to look at a horse that had some strange disease. The client, after consulting his doctor book, had become quite apprehensive.

The horse was a 12-year-old black gelding. It was one of five head shipped to the ranch six weeks previously from southeastern Texas. The animals were accompanied by a health certificate, and all appeared normal on arrival. They were immediately turned into a small isolation pasture completely separate from the native remuda.

One evening the animal in question appeared with a lacerated wound in the right axillary space. The owner applied crude tar as a treatment. In nine days the wound was almost healed but the patient became "a little sore in the hind legs." Nodules the size of a large pea appeared on all four legs, inside the thighs, on the brisket, and extended a short distance up the neck. Nodules gradually became more prominent and, on the fifth day after their appearance, all ruptured spontaneously. In this condition the horse was first observed.

Symptoms

The animal was bright, clear-eyed, and had never been off feed. Temperature was recorded as 100.2 F. The original wound was completely healed except for the denuded area where the tar had been applied. Mucous membranes and nasal mucosa appeared normal. Visible lymph nodes were not enlarged nor beaded and the body lymph nodes were not palpable. The ruptured nodules extended from the fetlocks dorsally, following the course of lymphatics, on both the medial and lateral



Ulcerative lymphangitis. Note small ulcers and encrustations along lymphatics on both the medial and lateral aspects of all four limbs. Photograph taken 24 hours after nodules had ruptured.

aspects of the legs. There were a few lesions on the brisket and lower portions of the neck, which gave the appearance more of pustules than true ulcers. The edges were not raised and there was a minimum of granulation tissue. Discharge was purulosanguineous, forming crusts over the lesions. Removal of the crust revealed a weeping erosion of the skin.

In preparing smears for microscopic examination 24 hours later, it was noted the lesions appeared less moist, with no fresh discharge. The crusts were still present and material for the slides was obtained by removal of these crusts and curetting the exposed ulceration.

Complicating the picture was the fact that two more horses from the same shipment were developing nodules along the lymphatics of the legs similar to the original case. Although the nodules were numerous and prominent, animals exhibited no evidence of systemic reaction or lameness.

The only treatment was the administration of 1,800,000 units of procaine penicillin in oil intramuscularly and the application of smear 62 to discourage screwworm infestation.

Two slides were prepared from the lesion scrapings in an attempt to establish etiology. One was stained using Gram's process and the other by the use of Wright's stain. Results were inconclusive. A few Gram-positive coccoid organisms were observed, none being intracellular. Hutyra, Marek and Manninger, as well as Hagan and Merchant, agree generally that the cause of ulcerative lymphangitis is *Corynebacterium pseudotuberculosis;* a pleomorphic, Gram-positive, short rod. The organism as such was not identified. A more productive microscopic examination was anticipated using fresh material from the two new cases expected to follow the course of the first.

Because the ranch was isolated and 65 miles from the writer's office, the owner was instructed to call when the nodules of the two new cases ruptured. Ten days elapsed before a letter was received stating the first horse was healing nicely and the two later cases had never progressed past the nodular stage. Nodules had disappeared without a single one rupturing.

The horse was examined the final time about two weeks later, when a mallein test was given, with negative results. Lesions had almost completely healed, with only the absence of hair along the course of the lymphatic vessels of the legs where the nodules had ruptured. There was a minimum of cicatricial tissue. An abrased wound on the animal's back, received the day the nodules ruptured, showed only slightly advanced healing as compared to the disease lesions.

The use of penicillin in this case was of questionable value. Literature on the use of antibiotics in ulcerative lymphangitis could not be found, due probably to the rarity of the disease in this country.

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2. Hagan, W. A., The Infectious Diseases of Domestic Animals, Ithaca, N. Y., Comstock Publishing Co., 1943, p. 109.

3. Merchant, I. A., Veterinary Bacteriology, Ames, Ia., Iowa State College Press, 1942, p. 458.

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Successful Treatment of Dermatoses in Small Animals

BERNARD S. KLAUSMAN, V.M.D.,
Jackson Heights, New York

A successful treatment agent for common dermatoses in household pets must meet a number of rigid requirements to be extensively employed.

Primarily, of course, it must satisfactorily relieve the symptoms and promote return to normal; second, it should be quick-drying; next, it must be odorless or have a tolerable odor; fourth, it should be non-staining; and last, it must not be toxic. An ideal agent will possess these advantages and be safe for use on cats.

Evaluation of a preparation named liquiderm,® for which all these qualities were claimed, was made when this product was used as routine treatment of a group of animals on admission to the writer's clinic. No attempt was made to equalize the number of cases in each skin condition, nor to set up a controlled study. The preparation was used on each patient exhibiting symptoms of dermatitis in which it might be indicated.

Results

The preparation substantiated the manufacturer's claims made for it. Improvement was evident after a few applications and complete healing was noted within a week or ten days, except in one stubborn case of fungus infection of the toes of a dog. This case had not been relieved by previous treatment with other medication, but with the preparation under investigation, it yielded in three weeks.

Success in the treatment of cats was highly

®Colin Pharmacal Co., Long Island City, N. Y.

gratifying. Not only were lesions cleared in about the same time as in dogs, but not one cat showed a single symptom of sensitivity to the preparation.

Results Following the Use of Liquiderm in the Treatment of Skin Diseases of Dogs and Cats

For Dogs

Disease	Cases	Healed	Improved	No Change
Sarcoptic mange	12	10	2	0
Eczema (moist)	7	5	2	0
Eczema (dry)	5	2	2	1
Dermatitis (non-specific)	14	9	3	2
Pruritus (non-specific)	9	7	2	0
Ringworm	8	6	2	0
Fungus infections:				
toes	8	8	0	0
other parts	7	6	0	1
Chronic otitis media	5	1	2	2
External ulcers (ears)	2	2	0	0

For Cats

Sarcoptic mange	10	9	1	0
Eczema (moist)	5	4	1	0
Eczema (dry)	4	2	1	1
Pruritus	12	8	3	1
Fungus infections	6	6	0	0
Chronic otitis media	7	2	2	3
Dermatitis (non-specific)	5	3	1	1

Least successful were cases of chronic otitis media, but despite the fact that these were of long standing, the results were satisfactory in a majority of patients.

Summary

1. A series of successfully treated dermatoses, in dogs and cats, with a liquid preparation has been described. The preparation is quick drying, non-staining and has a pleasant odor.

2. All cases made rapid improvement. Healing in most occurred within ten days. One case of stubborn fungus infection, in a dog, which had not yielded to other medication, disappeared in three weeks.

3. Cats, usually sensitive to most types of skin medication, were successfully treated. In no case, was it necessary to discontinue treatment because of side effects.

4. Satisfactory results were obtained in long standing cases of otitis media in both species.

Tuberculosis in a Young Dachshund

ALLEN B. SHOPMAKER, D.V.M., and EDWIN E. EPSTEIN, D.V.M., St. Louis, Missouri

Incidence of tuberculosis in dogs is not unknown but presumably rare since only occasional cases have been reported. Primary characteristics may be summarized briefly as follows: (1) occurs most frequently in animals from one to five years of age; (2) symptoms observed include loss of weight, cough, hypertrophy of lymph gland in the region of the head and neck.

On February 23, 1952, a male Dachshund, just under one year of age, was presented with a history of lack of appetite and "no pep." Temperature was noted to be 102.6 F. Fecal smear was negative. The client was advised to bring in a stool sample for flotation analysis. Six cans Hill's P/D prescription diet were dispensed.

The following notations were recorded on the dates indicated:

February 26: Poor appetite, vomiting, crying, carrying left hind leg off ground; temperature, normal. Dispensed tablets for nausea, and sedative capsules.

March 1: Temperature 102.2 F.; rales present in both lungs; anorexia, dehydration, suggestive of atypical pneumonia. Treatment: 20 cc. saline, 1 cc. lederplex[1]; dispensed 250 mg. capsules of aureomycin to be given two daily for three days.

March 6: Eyes glazed; temperature 103.6 F.; rales both lungs. Penicillin injected (600,000 units). Dispensed 20 super D perles[2] and ophthalmic ointment.

March 8: Temperature 103.8 F. As the animal had not responded, tuberculosis was suspected. Tuberculin P.P.D. was injected intradermally. Treatment included the administration of 0.5 gm. streptomycin subcutaneously, plus 100 mg. aureomycin intravenously.

March 9: Temperature 102 F.; fecal examination positive for tapeworms.

March 10: Tuberculin test was positive. Euthanasia recommended.

Significant postmortem findings were caseous lesions in lungs and mediastinal lymph nodes, and thickened walls of the intestinal tract.

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The simultaneous treatment designed to control hog cholera may also be the cause of its perpetuation.

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[1]Lederle Laboratories Division, American Cyanamid Co., Pearl River, N. Y.

[2]The Upjohn Company, Kalamazoo, Mich.

"Call Your Veterinarian"

KNOW YOUR LIVESTOCK PROBLEMS
Another in the series "What the Veterinary Profession Means to Mankind"
ACETONEMIA...
HOW IT ACTS—
Appetite and milk flow stop. There's a sharp loss in weight.
Cows may appear nervous, excited, lick hair or gnash teeth.
Condition may look like milk fever or "hardcore" disease.
ACT FAST...
Time is urgent. Delay in calling veterinarian may result in loss of animal!
WHAT TO DO—
Watch feed intake, milk flow, to detect disease symptoms early.
Call veterinarian immediately. Follow his instructions carefully.
Beware of "sure-shot" remedies.
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A

Aberdeen Angus sale record, 180
Abortion, and resorption in chinchillas, 439
in cows, due to leptospirosis, 115
in heifer, 76
vibrionic, 85
ABR, capillary tube, milk whey and blood serum agglutination tests, comparison of, 48
test in brucellosis, 482
Abstracts of literature, 77, 119, 164, 255, 349, 389, 439, 479, 522
Acanthosis nigricans in dogs, 346
Accidental warfarin poisoning of young pigs: A hematological report, 372
Acetonemia, 491
decreased corticoadrenal activity in, 439
in cattle, 58
sodium acetate in, 303
Actinomycosis, penicillin in, 255
Acute salt poisoning in swine, 436
Agricultural research, challenge to, 143
Agricultural vocational teachers and county agents cannot act as serum jobbers, 31
Air sac infection, in poultry, 322
research, 431
Alabama prohibits sale of HC virus, 72
American Animal Hospital Association meeting, 113, 161, 249
Ammonium lactate in ketosis of cattle, 162
Amsinckia intermedia, tarweed, as a factor in hepatic cirrhosis of swine, 55
Anal sacs of dogs, plaster of Paris for packing, 32
Anamnestic reaction as an aid in differentiation of vaccinal from infection titers of brucellosis (abortus) in cows, 323
Anaplasmosis, advisory committee on, 24
aureomycin in, 117
Ancient Chinese insect therapy in human and veterinary practice, 461
Anemia, equine infectious, attempts to propagate virus of, 229
Anesthesia, bovine, 267
epidural, in colic of horses, 120
for hogs, 36
of the teat, 112
surital sodium, 138
surital sodium and morphine, in canine surgery, 97
Animal health, principles of, 36, 76, 116, 162, 251, 300, 342, 385, 432, 475, 520
Announcements, Jan.-XL, Apr.-XLIII, May-XLII
Anthrax, 381, 515
briefs, 300
in birds, 118, 253
incidence of, 474
in livestock during 1951 and comparative data on the disease from 1945 through 1951, 315
livestock during the first quarter of 1952 with special reference to outbreaks in swine in the Midwest, 274
in man, 475
outbreak, Florida, 96
unusual outbreaks of, 209
vaccine avirulent, 460
Antibiotic-vasoconstrictor therapy for intranasal treatment of dogs and cats, 424
Antibiotics, Feb.-XXIV, 162
agents in small animal practice, 59
and ephedrine in acute mastitis of sheep and cattle, 52
as feed supplements, 296
feeding supplements for poults, 47
for intramammary infusions, 258
increase rumen bacterial count, 114
in egg production, 73, 521
in leptospirosis, 386
in pig feed, Dec.-XXII
in sterility, 185
in swine rations, 475
in treatment of avian monocytosis, 456
production, 34
production and use, 288
Antirabies legislation in Illinois, 96
Antiserum, period of passive immunity, Feb.-XXIII
Aplastic anemia, and chloramphenicol, 427
of cattle, 389
Apple poisoning in dairy cows, 405
Application of the Kingma tube for continuous intravenous therapy, 139
Army, extrance rank and pay for veterinarians, 381, 471
Medical Service unit cited, 112
veterinarians, role of, May-XXX
veterinary detachment citation, June-XXVII
Artificial eye for a bull, 158
Artificial insemination, in 1892, 475
in Pennsylvania, Jan.-XXII
of poultry, 9
Artificial lighting of turkey breeders, 433
Associated Serum Producers' campaign, 108, Jan.-XXVII, Dec.-XXII
Atrophic rhinitis, 8, 247, 388, 515
proposed control measures, 115
Attempts to propagate the virus of equine infectious anemia in embryonated eggs with special reference to cultivation in the yolk sac, 229
Aujeszky's disease, 519
Aureomycin, concentrations of, in milk, blood and urine, 367
in anaplasmosis, 117
in retained placenta in cows, 451
oblets for scours in dairy calves, 475
response on calf growth and health, Apr.-XXV
Autopsy-incinerator building, Montana experiment station, Feb.-XXII
Avian
see also Poultry
lymphomatosis, 118, 300
monocytosis, antibiotics in treatment of, 456
Avian pneumoencephalitis
see Newcastle disease
see Pneumoencephalitis
Avirulent anthrax vaccine, 460
A.V.M.A. committee on legislation, Sept.-XXVIII
committee on public relations, Sept.-XXXVIII
convention, 64, 71, 115, 159, 297, 335
editor-in-chief, W. A. Aitken, 114
humane act award, nominations for, 113
research program, Aug.-XXIII
Awards, humane act, 341
Nobel prize, 519
Awards to veterinarians
Beadner, H. F., Sept.-XXXIV
Cotton, C. E., 340
English, B. W., 35
Husman, A. A., 341
Little, Ralph B., 341

B

Bacitracin for growth stimulation of pigs, Aug.-XXXI
Belladonna poisoning in swine, 392

Benzene hexachloride (BHC), dipping sheep, at public stockyards, 31
for human pinworm infection, 345
solution in scabies in sheep, 76
Biological products for prevention and control of poultry diseases, 280
Biological warfare, defense against, 471
Biologicals and pharmaceuticals, report of committee on, 23
Biology of swine lungworms, 38
Biopsy, liver, 140
Bird transmission of foot-and-mouth disease, 452
Birds, anthrax in, 118, 253
Bitches
see also Dog
determination of breeding time, 390
progesterone to delay estrum in, 467
Blackhead of turkeys, enheptin in, 117
Blackleg in cattle, treatment of, 36
Bleeding, mammary vein, 206
Blood, examinations in canine and feline diseases, 375
plasma in canine shock, June-XXXVI
sedimentation test, information from, June-XXXVI
serum, ABR, capillary tube and blood serum agglutination tests, comparison of, 48
sludged, 133
spots in eggs, 478
urea determination test, 247
urine and milk concentrations of aureomycin, 367
Boars, hormone treatment of, 450
Bonemeal, regulations on, Aug.-XXIII, 379
Bones, long, Rush intramedullary fixation of, 43
Book reviews,
Cow Owner's Handbook, The, 124
Die Untersuchung von Tieren Stammender Lebersmittel, 484
Etiology, Diagnosis and Control of Infectious Bovine Mastitis, 350
Insects — The Yearbook of Agriculture, 484
Klinische Diagnostik der inneren Erkrankungen und Hautkrank heiten der Haustiere, 440
Livestock Health Encyclopedia, 214
Modern Dog Encyclopedia, The, 350
Outline of the Infectious Diseases of Domestic Animals, An, 260
Pipe Dreams about Leather and Saddle, 166
Secretion of Milk, 440
Sheep Diseases, 214
Sheep Management and Diseases, 124
Standard Values in Blood, 260
Structure of the Fowl, The, 166
Understanding Heredity: An Introduction to Genetics, 440
Zoology of Tapeworms, The, 166
Bovine
see also Cattle
anesthesia, 267
fertility, treatment of, 218
hyperkeratosis, experimental production of symptoms, 479
leptospirosis, 13, 106, 188, 385
nutrition and trace minerals, 255
tuberculosis nonexistent in Finland, 254
Breeding, control of, 70
Breeds of meat type hogs, new, 262
Brief outline of the toxicology of some common poisons, 412
Bronchitis infectious, eradicated by depopulation, 521
Brooder house, cannibalism in, 75
Brucella abortus vaccination, intracaudal and subcutaneous, May-XXXVI
Brucella infection tests, interpretation of, 255
Brucella melitensis, viability of, in cured hams, 34
Brucellosis, 20
ABR test in, 482
and paratuberculosis controls, May-XXV
committee, national, 435
conference, North Central States, 416
conference notes, Oct.-XXXVI
control and eradication, 181
control in California, 381
differentiation of vaccinal from infection titers, in cows, 323
eradication, 208
eradication program, progress of, July-XXXII
federal-state eradication project, 6
human, 34
in cattle, rats transmit, 522
in sheep, 520
indemnity payments, 178
lower incidence of, 426
milk plate test for, 77
research, 179
swine, control in herd with valuable blood lines, 448
swine, in Illinois, 208
Bulletin,
Marketing Farm Poultry, 253
on feed formulas for livestock, Jan.-XXXI
on goose raising, 39
on prescription diets for dogs, Jan.-XXVIII
Turkey Diseases, 214
Vibriosis in Cattle, 440
Bulls
see also Cattle
artificial eye for, 168
exerciser for, 42
faulty emasculation of, 256
Burns, first-aid for shock from, 36
Business principles of veterinary practice, 293

C

Calcium deficiency in newborn lambs, 258
Calcium sulfide in treatment of warts, 36
Calculi, urinary, 438
California's new pathological laboratory, 442
Calves
see also Cattle
aureomycin oblets for scours in, 475
dairy, portable pens for control of diseases of, 485
1,000,000 vaccinated, 114
Canada ends foot-and-mouth disease controls, 429
Canicola infection in dogs, 389
Canine
see also Dogs
coccidiosis: diagnosis and therapy with coccithane, 221
dermatoses, new therapeutic agent for, 286
diseases, blood examinations in, 375
distemper and "hard pad" disease, 417
distemper virus, and Newcastle disease in puppies, studies of, 513
hepatitis, infectious, 191
hepatitis, infectious, etiological agent of, 251
histoplasmosis, diagnosis of, 140
medicine, toxicology, in, 331
pancreatitis and its treatment, 304
pathology: an historical essay on some pioneer contributions of D. P. Blaine (1770-1845), 242
surgery, surital sodium and morphine anesthesia in, 97
Cannabilism in brooder house, 75
Capillaria annulata of poultry, 74
Capillary tube, ABR, milk whey and blood serum agglutination tests, comparison of, 48
Carbohydrate metabolism and the stress diseases, 522
Carbon tetrachloride, safer drenching with, 299
"CARE" enlists public for fight on global disease, 458
Castrating, and fattening sows, 349
the ridgling hog, 392
Casualties, human, 208
Catfish, judging age of, 116

Cats
see also Feline
antibiotic-vasoconstrictor therapy for, 424
opening abdominal cavity of, 116
Cattle
see also Bovine
see also Bulls
see also Calves
see also Cows
ammonium lactate in ketosis of, 162
aplastic anemia of, 389
artificial insemination of, Jan.-XXII
blackleg, treatment of, 36
coccidiosis in, 10
effects on, of prolonged treatment with a DDT spray, 94
ephedrine and antibiotics in mastitis of, 52
ergot poisoning in, 439
fescue lameness in, 298
fracture of penis in the bull, 175
grubs, losses due to, 73
hyperkeratosis of, Mar.-XXXV
infectious diseases of, committee on, 24
infectious keratitis of, 460
in Kansas City flood, 302
internal parasites of, 172, 199
intraperitoneal injection in, 473
lungworms in, 299
noseprinting, 471
on feed, statistics, 114
rats transmit brucellosis to, 522
shipping fever in, 251
simple method of obtaining urine from, 120
slaughtered, bruised, Dec.-XXII
ticks, parathion tested on, 38
trypanosomiasis-resistant, 117
vampire bat paralytic rabies in, 502
Cerebrospinal filariasis, 434
vs. nutritional paresis, 38
Cervical cultures in mares, 182
Check list of parasites of domestic animals, in Georgia, 65
Chemical stimulates weight gain in swine, 184
Chick sexing machine, 75
Chicken semen, diluted, 118
Chickens
see also Chicks
see also Poultry
breed susceptibility to coccidiosis, 477
intramuscular and rectal vaccination against Newcastle disease, 101
live, crate of, 73
new blood group, 75
Newcastle disease, 39
sulfaquinoxaline medication of, 28
Chicks
see also Poultry
diseases during brooding period, 270
rearing day-old, 75
vaccination of, against infectious bronchitis, 39
Chinchillas, edema of glottis in, 41
malocclusion in, 119
parasites of, 388
resorption and abortion in, 439
slow or nonbreeding, estradiol cyclopentylate in, 212
Chinese insect therapy, 461
Chloramphenicol, and aplastic anemia, 427
in coccidiosis of dogs, 122
Chlorinated hydrocarbon insecticides, 439
Chloromycetin, in coccidiosis of dogs, 122
therapy in hard pad disease,54
Chlorophyll, added to dog foods, Feb.-XXXVI
therapeutic agents containing, 155
veterinary line, new, Apr.-XXV
Circular, Microscopic Diagnosis of Parasitism in Domestic Animals, 484
Cirrhosis, hepatic, in swine, 55
Civil defense, veterinarian and, 195
Clients, responsibility to, 469
Clinic, future veterinary, 136
Clinical reports, 40, 78, 121, 210, 256, 302, 346, 390, 436, 480, 523
Clinical, results following terramycin therapy in virus diseases, 121
use of therapeutic agents containing chlorophyll, 155
Coccidiosis, breed susceptibility to, 477
canine, diagnosis and therapy with coccithane, 221
in cattle, 10
of dogs, chloramphenicol (chloromycetin) in, 122
resistance to, 387
vaccine, 429
Coccithane in diagnosis and therapy of canine coccidiosis, 221
Colic of horses, epidural anesthesia in, 120
Committee reports, U. S. Livestock Sanitary Assn., 17-24
Communicable diseases reported, 198
Comparison, of intramuscular and rectal vaccination of chickens against Newcastle disease, 101
of the ABR, capillary tube, milk whey and blood serum agglutination tests, 48
Compenamine and procaine penicillin: comparative plasma levels in dogs, 377
Continuous phenothiazine therapy for horses; part IV, 25
Copper deficiency associated with demyelinating diseases of sheep, 385
Corn poisoning in swine, Dec.-XXVI
Corticoadrenal activity decreased in acetonemia, 439
Cortisone for treatment of trichinosis in man, 279
production, 517
Cosmetic ear surgery, 193
Cotton sutures, 141
County agents and agricultural vocational teachers cannot act as serum jobbers, 31
Cows
see also Cattle
abortion due to leptospirosis, 115
population, 432
rapid sperm transport in, 298
Cryptococcus, mastitis due to, 141
Curare increases depth of anesthesia, 212
Cystic calculus in the horse, 348
Cystic ovaries in cattle, 300
Cysticerosis, 388
in cattle, 345

D

Dairy cows, apple poisoning in, 405
infertility problems in, 397
Dairy heifers, lack of mammary development in, 300
Dairy herds, louse control in, July-XXVI
Danger in lay prescription for animal diseases, 207
DDT, British question position on, 345
radioactive carbon in, 383
resistant insects, 246
spray, effects on beef cattle, 94
Deaths of veterinarians
see also Obituaries
Jan.-XL, Feb.-XL, Mar.-XLIII, Apr.-XLIV, May-XLIV, June-XLIII, July-XLI, Aug.-XL, Sept.-XLIV, Oct.-XL, Nov.-XXXIX Dec.-XL
Deciduous canines in a monkey, removal of, 123
Demyelinating diseases of sheep, 385
Dermatitis, fungoid, in cattle, Nov.-XXVIII
Dermatology, neomycin sulfate in, 239
Dermatoses in small animals, 524
Dermatosis, canine, new therapeutic agent for, 286
Derriengue in cattle, 502
Determination of breeding time in bitch from vaginal smears, 390
Dieldrin, toxicology of, 74

Diethylstibestrol, for finishing chickens and turkeys, 387
in nonbreeding does, 80
injection in poultry, 344

Diphtheria epidemic in Norway, 386

Dipping of sheep in benzene hexachloride (BHC) at public stockyards, 31

Dirofilaria immitis, periodicity of, 26

Disability, cost of, Apr.-XXIII

Disease control, and research programs intensified, 246
information needed, 515

Disease-free animals, meat from, 520

Disease organisms and vectors, interstate transport or import, 501

Disease-producing agents, determination of methods of introduction, 426

Diseases, and surgery of the eye, 137
of chicks and poults during brooding period, 270
of poultry and pet birds, 142

Disinfecting poultry yards and houses, fire guns for, 433

Distemper, canine, and hard pad disease, 417
feline, 99
virus and Newcastle disease in puppies, studies of, 513
virus, egg-adapted, immune response of ferrets to, 461

Doctor for the flock, 33

Does, nonbreeding, diethylstilbestrol in, 80

Dogs
see also Bitches
acanthosis nigricans in, 346
antibiotic-vasoconstrictor therapy for, 424
calcium sulfide in treatment of warts in, 36
canicola infection in, 389
chloramphenicol (chloromycetin) in coccidiosis of, 122
echinococcosis in, treatment of, 342
filariasis in, in Indiana, 384
foods, chlorophyll added to, Feb.-XXXVI
in "Get-Out-The-Vote" campaign, 474
ovulation in bitches, 207
periodicity of microfilaria (*Dirofilaria immitis*), 26, 285
pictorial representations in Egyptian tombs, Feb.-XXX
plasma levels of compenamine and procaine penicillin, 377
plaster of Paris for packing anal sacs of, 32
pound, for research, 246
torsion of the stomach in, 480
toxaphene poisoning in, 256
virus diseases of; infectious hepatitis, 282

Drugs and susceptibility to parasites, 74

Ducks
see also Poultry
potato meal as feed supplement for, 39

Dystocia in heifers, 382

E

Ear surgery, cosmetic, 193

Eastern states exposition, Feb.-XXVI

Echinococcosis in dogs, treatment of, 342

ECP in slow or nonbreeding chinchillas, 212

Edema disease of swine, 9, 247, 479

Edema of glottis in chinchilla, 41

Editorial comments, 31, 71, 112, 157, 207, 246, 296, 380, 427, 471, 515

Effective mastitis control, 89; erratum, Apr.-XXIII

Effects on beef cattle of prolonged treatment with a DDT spray, 94

Eggs, blood spots in, 478
liquid, whole, pasteurization of, 158, 433
per hen and unit of feed, 73
production, Sept.-XXII
production, antibiotics in, 73, 521
quality affected by feeds, 433
quality, improvement of, 344
temperature for storing, 433

Emasculation, faulty, 256

Emetine chloride for lungworm infestation of sheep and goats, 434

Encephalitis in Australia, Jan.-XXIV

Encephalomalacia, grant for study of, 253

Encephalomyelitis, western equine, 470

Enheptin in blackhead of turkeys, 117

Enheptin-T, action on *Histomonas meleagridis*, 389

Enteritis, feline infectious, treatment with antiserum and aureomycin, 327
Salmonella choleraesuis of young pigs, 307

Enterohepatitis, infectious, of turkeys, 388

Enterotoxin production, 321

Ephedrine and antibiotics in acute mastitis of sheep and cattle, 52

Epidural anesthesia in colic of horses, 120

Equine
see also Horses
encephalitis in pheasants, 163
encephalomyelitis, 381
encephalomyelitis, western, 470
infectious anemia, attempts to propagate virus of, 229
lymphangitis: a case report, 523

Ergot poisoning in cattle, 439

Erysipelas, swine, penicillin and vaccine treatment for, Nov.-XXX
vaccine, swine, new, 432

Erysipelothrix rhusiopathiae vaccine (desiccated), stability of, 27

Esophageal worms in a hound, 257

Estradiol cyclopentylate in slow or nonbreeding chinchillas, 212

Estrogens, for finishing chickens and turkeys, 387
increase feed utilization and weight gain of swine, 77

Estrous cycle in cows, 158

Estrum in bitches, progesterone to delay, 467

Evaluation of neomycin sulfate treatment of bovine mastitis, 407

Examinations, Apr.-XLIII, May-XL, June-XXXVI, July-XL, Sept.-XXVII, Oct.-XXXIII

Exerciser for bulls, 42

Experience with scouring pigs, 482

Experiences in treating feline panleukopenia (feline distemper), 99

External fistula in a six-week-old pig, 41

Eye, artificial, for a bull, 168
diseases and surgery of, 137

F

Fasciola hepatica, therapeutic agents against, 522

Fattening sows, 349

Federal restrictions on psittacine birds, Mar.-XXXV

Feeds, effect on egg quality, 433
formulas for livestock, bulletin, Jan.-XXXI
supplements, antibiotics as, 296

Feline
see also Cats
diseases, blood examinations in, 375
distemper, 99
infectious entertis, treatment with antiserum and aureomycin, 327
panleukopenia, 99

Femur, distal end, reduction of fractures of, 509
Ferrets, immune response of, to egg-adapted distemper virus, 461
Fertility, bovine, treatment of, 128
Fescue lameness in cattle, 298
Filariasis, cerebrospinal, 434
in dogs in Indiana, 384
Films
Laboratory Diagnosis of Rabies, 260
on livestock pest control, 396
Striking Back against Rabies, 260
Finland, bovine tuberculosis non-existent in, 254
Fire guns for disinfecting poultry yards and houses, 433
Fireweed poisoning, 247
Fish meal, growth factor in, 433
Fistula, external, in a six-week-old pig, 41
milk, surgery for, 437
Flood, Kansas City, cattle in, 302
Florida anthrax outbreak, 96
Florida State V.M.A. meeting, 127
Fluoridation of water, effect on livestock, 116
Fluorosis in cattle, 479
Foals
see also Horses
immunity to tetanus, 77
Follicle hormone for castrating and fattening sows, 349
Food poisoning, due to Salmonella infections, 386
from poultry meat, 166
Foot-and-mouth disease, 22, 515, Dec.-XXII
bird transmission of, 452
in Canada, 157, 249, 429
in Great Britain, 72, 296
in Mexico, 4, Mar.-XL, 250, 428
in Switzerland, 16
panel discussion, 5
report, 207
research at Pirbright, 447
research institute, Plum Island, 380
vigilante committees, 474
Foreign bodies, in stomach, 208
intestinal, Apr.-XXXIX
penetration, May-XXV
For your own protection—maintain a tax reserve, Mar.-XXII
Fowl
see also Poultry
pest, notes on, 24
pox, 344
Fracture of the penis in the bull, 175
Fractures of distal end of femur, reduction of, 509
Fungoid dermatitis in cattle, Nov.-XXVIII
Fungus infections of animals, 301

G

Gapeworm infestation, phenothiazine for, 345
Garbage feeding, legislation on, 517
Gas phlegmon: report of two cases, 210
Geese
see also Poultry
breeds of, 75
mating, 75
sexing, 75
Genital organs, rectal examination of, 72
Georgia, check list of parasites reported in, 65
Georgia V. M. A. meeting, Sept.-XXXVIII
Gestation length of the horse, variation in, 116
Giltner Hall, M.S.C., 519
Gizzard skinner, 75
Glottis, edema of, in chinchilla, 41
Goats, emetine chloride for lungworm infestation of, 434
Goose
see also Poultry
eggs, incubation period, 75
raising, bulletin on, 39
Granulomas, bovine, diagnosis with reference to tuberculosis, 15
Greyhounds, coursing, Dec.-XXI
Grubs, cattle losses due to, 73
infestation of cattle, spraying for, 342
Gut edema, postvaccination, 79

H

Hard pad disease, and canine distemper, 417
chloromycetin therapy in, 54
Headlines during 1952, 515
Heat, high environmental, effects of, 349
Heatstroke in hogs, 438
Heifer, abortion in, 76
Hemorrhages in trichlorethylene-extracted, soy-bean oil meal poisoning, 105
Hepatic cirrhosis in swine, 55
Hepatitis, infectious canine, 191
Highlights of the 89th A.V.M.A. convention, 335
Histoplasmosis, canine, diagnosis of, 140
Hog cholera, and rabies, immunization with modified living virus in, 144
late virus treatment, 471
report of committee on eradication of, 17
vaccination and vaccines, 337
vaccination, ideal age, 98
vaccines, newer, 162
virus, Alabama prohibits sale, 72
virus vaccine, live, tissue culture, modified, 11
virus vaccine, rabbit-adapted, modified, rovac, 12
virus vaccine, rabbit-modified, swine propagated, M.L.V., 13
white blood cell count in, 497
Hogs
see also Swine
anesthesia for, 36
heatstroke in, 438
new breeds of meat type developed, 262
ridgling, castrating, 392
Holidays in Korea, Feb.-XXX
Hormone
influence on growth and carcass quality of lambs, 522
stimulation of lactation, 72
treated poultry, Feb.-XXIII
treatment of sows and boars, 450
Hormones to increase mammary secretion, 520
Horses
see also Equine
see also Foals
see also Mares
census, May-XXXVI
colic, epidural anesthesia in, 120
continuous phenothiazine therapy for, part IV, 25
cystic calculus in, 348
gestation length, 116
infectious anemia in, 120
number slaughtered, 76
pyramidal disease, shoeing for, 36
simple method of obtaining urine from, 120
tail-setting of, 34
Thoroughbred, sensitivity to drugs, 396
H. P. vehicle, use of, 78
Huntington Hotel, Pasadena, 113
Hyperkeratosis, Aug.-XXIII
bovine, experimental production of symptoms, 479
of cattle, Mar. XXXV, 342
(X-disease) produced experimentally in Nebraska, 35

I

Illinois antirabies legislation, 96
Immune response of ferrets to vaccination with egg-adapted distemper virus. I. Time of development of resistance to virulent distemper virus, 461
Immunization with modified living virus with particular reference to rabies and hog cholera, 144
Income protection insurance, 430
Incubation period for goose eggs, 75

Indiana, V.M.A. meeting, 261
report of state veterinarian, 280
Infectious anemia in horses, 120
Infectious bronchitis of chicks, vaccination against, 39
eradicated by depopulation, 521
Infectious canine hepatitis, May-XXXVI, 191
etiological agent of, 251
Infectious enterohepatitis of turkeys, 388
Infectious hepatitis of dogs, 282
Infectious keratitis of cattle, 460
Infectious sinusitis of turkeys, 39
Infertility, in mares, 9, 359
problems in dairy herds, 397
Influence of protein on the milk fever complex (a four year study). Part I: milk fever, 215; part II, ketosis (acetonemia), 491
Insect, pest survey and reporting service, 247
therapy, ancient Chinese, 461
Insecticides, chlorinated hydrocarbon, 439
DDT-resistant insects, 246
Insurance, income protection, 430
Internal parasites of cattle and their control, 172
International Congress of Animal Reproduction, Copenhagen, Mar.-XXXVI
International Veterinary Congress, XVth, Stockholm, 383, 514
Intramuscular, and rectal vaccination of chickens against Newcastle disease, 101
use of terramycin in treatment of mastitis due to *Pseudomonas aeruginosa*, 40
Intraperitoneal injection in cattle, 473
Intravenous therapy, continuous, Kingma tube for, 139
Iowa, Merchant named dean, 248

J

Johne's disease: environment and management. Part I. general considerations, 443
in sheep, 165

K

Kansas City V. M. A. group study, June-XXXII
Kansas-Missouri meeting, Mar.-XXVII
Kansas veterinary conference, Sept.-XL
Keep those receipts, Dec.-XXXI
Ketosis, 491
in cattle, ammonium lactate in, 162
Kidney worm of swine, 116
Kingma tube for continuous intravenous therapy, 139
Korea, holidays in, Feb.-XXX

L

Lactation, hormone stimulation of, 72
Lambs
see also Sheep
hormone influence on growth and carcass quality of, 522
newborn, calcium deficiency in, 258
phenothiazine salt mixture for, 74
ruminant tapeworms in, 74
sodium silicate predisposes to urinary calculi, 161
Lay prescription for animal disease, danger in, 207
Leptospiral infection due to *L. pomona*, 76
Leptospirosis, Apr.-XL, 476
antibiotics in, 386
antigen for diagnosis, Mar.-XXXVI
blood urea determination test in, 247
bovine, 13, 106, 385
Leucocytozoon andrewsi, blood parasite of domestic animals, Mar.-XXXVI
Lice, poultry, 273
Life expectancy, Oct.-XXIV
Lindane, for armed forces, Feb.-XXXII
for cattle scabies, 453
Listeriosis in cattle and sheep, 266
Litter, built-up, parasite ova in, 304
system in laying houses, 164
Liver biopsy, 140
Livestock, conditions—past, present and future, 6
losses intolerable, 159
pest control film, 396
Louse control in dairy herds, July-XXVI
Lubricant, new general purpose, 507
Lungworm, infection in sheep, 255
infestation of sheep and goats, emetine chloride for, 434
in cattle, 299
swine, biology of, 38
Lymphangitis, equine, 523
Lymphomatosis, avian, 118, 300
Lyxoflavin, new B complex vitamin, 34

M

Malaria, 301
Malarial parasite, *Plasmodium berghei*, 74
Malocclusion in the chinchilla, 119
Mammary development, lack of, in dairy heifers, 300
Mammary vein bleeding, 206
Mares
see also Horses
cervical cultures in, 182
infertility in, 9, 359
Marketing Farm Poultry, bulletin 253
Mastitis, bovine, neomycin sulfate in, 407
control, effective, 89; erratum, Apr.-XXIII
control, laboratory assistance in, Apr.-XXVIII
due to Cryptococcus, 141
of sheep and cattle, ephedrine and antibiotics in, 52
streptococcic, streptomycin in, 233
use of terramycin in treatment of, 40
Mating injuries in turkeys, 478
Meat, and milk hygiene, 14
for servicemen, 72
from disease-free animals, 520
inspection service, value of, 163
on the hoof, 248
quality in calves, scanty rations no detriment to, May-XXXVI
Metcalf-Hatch law, 384
Mexico declared free of foot-and-mouth disease, 427
Michigan State College, fellowships, May-XXII
new facilities, 519
new *x*-ray machine at, Apr.-XL
Microfilaria *(Dirofilaria immitis)* periodicity of, 26, 285
Midwest Small Animal Association meeting with A.A.H.A., Nov.-XXV
Military surgeons, Washington meeting, 447
Milk, and meat hygiene, 14
blood and urine concentrations of aureomycin after intramammary infusions and intravenous administration, 367
plate test for brucellosis, 77
production record, world's, 73
sanitation, 468
whey, ABR, capillary tube and blood serum agglutination tests, comparison of, 48
Milk fever complex, influence of protein on; part I, 215; part II, 491
Milk fistula, surgery for, 437
Minerals in animal nutrition, 255
Minnesota, brucellosis-free counties, Apr.-XXXIX
veterinary short course, 80
Misdiagnosis, 438
Missouri-Kansas meeting, Mar.-XXVII
Missouri V. M. A. loan fund, 16

M.L.V., rabbit-modified, swine propagated, live virus, hog cholera vaccine, 13
Moldy corn poisoning in swine, Dec.-XXVI
Monkey, deciduous canines in, 123
Monocytosis, avian, antibiotics in treatment of, 456
Montana experiment station—new autopsy-incinerator building, Feb.-XXII
Morbidity and mortality statistics, report of committee on, 21
Morphine and surital sodium anesthesia in canine surgery, 97
Mortality and morbidity statistics, report of committee on, 21
Mosquitoes, effect on poultry, 39
Moss essay contest winner, 473
My conception of the future veterinary clinic, 136
My professional responsibility to my clients, 469
Mycotic stomatitis, 473

N

Nasal trichomonads in swine, 388
National Scientific Register survey of veterinarians, 208
Nebraska meeting, 47
Neomycin, 162
  sulfate in bovine mastitis, 407
  sulfate in veterinary dermatology and ophthalmology, 239
Neoplastic blood disease, nitrogen mustard in, 211
Newcastle disease
  see also Avian pneumoencephalitis
  see also Pneumoencephalitis and canine distemper virus in puppies, studies of, 513
  in chickens, 39
  intramuscular and rectal vaccination of chickens against, 101
  vaccinating pullets for, 385
New general purpose lubricant, 507
New therapeutic agent for treatment of canine dermatoses, 286
Niacin, increased production, Jan.-XXVIII
Nitrofurazone as a therapeutic agent in *Salmonella choleraesuis* enteritis of young pigs, 307
Nitrogen mustard in neoplastic blood disease, 211
Nobel prize to American antibiotic researcher, 519
North Central States brucellosis conference, 416
Northwest Mississippi V. M. A. clinic, Nov.-XXXII
Noseprinting cattle, 471
Nutrient allowances for poultry, booklet on, 344
Nutrition, livestock, 474
  minerals in, 255
  role of rumen in, 263
Nutritional paresis *vs.* cerebrospinal filariasis, 38

O

Obituaries
  see also Deaths of Veterinarians
  Burriss, J. T., Oct.-XXVI
  Campbell, D. M., 169, 170
  Cotton, W. E., Jan.-XXXII
  Hilty, Reuben, May-XXXVIII
  Kelser, R. A., 250
  McAdory, I. S., Oct.-XXII
  MacNabb, A. L., Apr.-XXXVI
  Mohler, J. R., Apr.-XXVI
  Shore, H. J., Aug.-XXVI
Observations, of the routine use of cervical cultures in mares, 182
  of the use of H. P. vehicle, 78
Oklahoma A. & M. College, Whitehair joins staff, June-XXX
Oklahoma, meeting, Mar.-XXX
  veterinary conference, July-XXIII
Ophthalmology, neomycin sulfate in, 239
Organisms and vectors, disease, import or interstate transport, 501
Ornithosis, 70
Osteopetrosis, 300
Otitis externa and surface wounds in small animals, 436
Outline of diagnosis of canine histoplasmosis, 140
Ovulation in bitches, 207

P

Pan American Veterinary Congress, Lima, Peru, 103
Pancreatitis, canine, and its treatment, 304
Panleukopenia, feline, 99
Papillons in America, July-XXVI
Paralysis, tick, 72, Feb.-XXII
Parasite, blood, of domestic animals, *Leucocytozoon andrewsi*, Mar.-XXXVI
Parasite charts, June-XL
Parasite, malarial, *Plasmodium berghei*, 74
Parasites, ova in built-up litter, 304
  drugs and susceptibilty to, 74
  internal, of cattle, and their control, 172
  internal, of cattle, research on, 199
  livestock, 1951 report of BAI, 252
  of chinchillas, 388
  of domestic animals in Georgia, check list of, 65
Parasitic diseases, report of committee on, 22
Parasitology, veterinary, 38, 74, 117, 252, 299, 345, 388, 434, 477
Parathion tested on cattle ticks, 38
Paratuberculosis and brucellosis controls, May-XXV
Parrot disease investigation, 33
Pasteur treatment, postvaccination paralysis following, 431
Pasteurization of liquid whole eggs, 158
Pathological laboratory, California, 442
Penicillin, and vaccine treatment for swine erysipelas, Nov.-XXX
  in actinomycosis, 255
Penis, fracture of, in the bull, 175
Periodicity of microfilaria *(Dirofilaria immitis)*, 26, 285
Pet birds, and poultry, diseases of, 142
  medication of, 162
Pharmaceuticals and biologicals, report of committee on, 23
Pheasants, equine encephalitis in, 163
  nesting places, 39
Phenothiazine, for gapeworm infestation, 345
  for sheep parasite control, 477
  salt mixture for lambs, 74
  therapy, continuous, for horses, part IV, 25
Physostigmin, antagonist to curare, 112
Pig
  see also Swine
  brooder, July-XXXI
  six-week-old, external fistula in, 41
Pigs
  see also Swine
  antibiotics in feed, Dec.-XXII
  bacitracin for growth stimulation of, Aug.-XXXI
  ideal age for vaccination against hog cholera, 98
  newly born, raising, 520
  proper time to vaccinate, 251
  Salmonella choleraesuis enteritis of, 307
  scouring, 482
  streptococcic infections in, 219
  warfarin poisoning of, 372
Pinworm infection, human, benzene hexachloride for, 345
Placenta, retained, in cows, aureomycin in, 451
Plague, 37
Plasma, extender for shock, 102
  levels of procaine penicillin and compenamine, in dogs, 377
Plasmodium berghei, malarial parasite, 74

Plaster of Paris for packing anal sacs of dogs, 32
Plum Island, N. Y., selected site for foot-and-mouth disease research institute, 380
Pneumoencephalitis
see also Newcastle disease
vaccination against with B_1 virus, 364
Poisons, toxicology of, 412
Population, world, 246
Portable pens compared with other enclosures for control of diseases of dairy calves, 485
Postmortem and laboratory diagnosis of bovine granulomas with reference to tuberculosis, 15
Postpartum paralysis in cows, 432
Postvaccination, gut edema, 79
paralysis following Pasteur treatment for rabies, 431
Poultry
see also Avian
see also Chickens
see also Chicks
see also Ducks
see also Fowl
see also Geese
see also Goose
see also Poults
see also Turkeys
air sac infection in, 322
and pet birds, diseases of, 142
and poultry products inspection, 21
artificial insemination of, 9
bulletin on marketing, 253
cannibalism in brooder house, 75
Capillaria annulata of, 74
diethylstilbestrol injections in, 344
diseases, biological products in, 280
effects of mosquitoes on, 39
estrogens for finishing, 387
flocks, how diseases become established in, 164
grading and inspection, amendment proposed, 58
hormone treated, Feb.-XXIII
industry, veterinary service to, 406
infectious bronchitis eradication in, 521
lice, 273
litter system in laying houses, 164
meat as cause of food poisoning, 166
meat production, 75
nutrient allowances for, booklet on, 344
official government graded, 115
practice problems, 39, 75, 118, 164, 253, 344, 387, 433, 478, 521
prerequisites for keeping free of pullorum disease, 253
processing sanitation, basic code covering, 320
production, May-XXII
starvation period before killing, 478
transmissible diseases of, 24
Poults
see also Poultry
diseases during brooding period, 270
Practice of veterinary medicine, 472
Prescription diets bulletin, for dogs, Jan.-XXVIII
Principles of animal health, 36, 76, 116, 162, 251, 300, 342, 385, 432, 475, 520
Procaine penicillin and compenamine: comparative plasma levels in dogs, 377
Production of enterotoxin by staphylococci recovered from bovine mammary gland, 321
Progesterone to delay estrum in bitches, 467
Prophylactic and therapeutic use of aureomycin in retained placenta in cows, 451
Protein, influence on milk fever complex; part I, 215; part II, 491
requirements of swine, 389
Pseudomonas aeruginosa, use of terramycin in treatment of mastitis due to, 40
Psittacine birds, federal restrictions on, Mar.-XXXV
Psittacosis, 70, 343, 455
Psychology of the client, Nov.-XXII
Public health, 37, 163, 254, 301, 343, 386, 435, 476
veterinarians, 476
veterinarian's responsibility in, 189
Public relations of the veterinary profession, 108
Pullets, vaccinating for Newcastle disease, 385
Pullorum disease, prerequisites for keeping poultry free of, 253
Pyramidal disease, shoeing lame horse for, 36

Q

Q fever, 37, 475
Quail, vitamin A deficiency in, 75
Quinacrine hydrochloride for *Taenia saginata*, 520

R

Rabies, and hog cholera, immunization with modified living virus in, 144
antiserum, 292
films on, 260
in cattle. I. Prevention of vampire bat paralytic rabies, derriengue, by vaccination with chick-embryo-adapted rabies virus, 502
in Iowa, 158
in Israel, Sept.-XXXII
in North Central States, 343
in United States, 23
legislation in Illinois, 96
postvaccination paralysis following Pasteur treatment for, 431
treating bitten child, 76
Radial vein, raising, 238
Radiation, in fight on screwworm fly, Jan.-XXVI
therapy, unique type, in small animal practice, 151
Ralston Purina Company research fellowship awards, Feb.-XXXV
Rats transmit brucellosis to cattle, 522
Receipts, keep, Dec.-XXXI
Rectal and intramuscular vaccination of chickens against Newcastle disease, 101
Reduction of fractures of distal end of femur, 509
Removal of infected deciduous canines in a monkey, 123
Report, of a series of deliberate warfarin poisonings, 235
of 55th annual meeting, U. S. Livestock Sanitary Assn., 1
on use of nitrogen mustard in two cases of neoplastic blood disease, 211
Research, and disease control programs intensified, 246
grant for studies of nutritional diseases, Apr.-XXXIX
on brucellosis of animals, 179
on internal parasites of cattle, 199
Resorption and abortion in chinchillas, 439
Responsibility to clients, 469
Rocky mountain spotted fever, 343
Role of the rumen in nutrition, 263
Rovac, rabbit-adapted, modified, live virus, hog cholera vaccine, 12
Ruggles small animal clinic, analysis of income and expense, 306
Rumen, in nutrition, role of, 263
microorganisms, balancing diet of, 280
Rupture of the urethra due to faulty emasculation, 256
Rush, intramedullary fixation of long bones as applied to veterinary surgery, 43
pin, 43

S

Salmon poisoning, 388
Salmonella choleraesuis enteritis of young pigs, 307
Salmonella food poisoning, 386

Salmonellosis, 343
Salt poisoning in swine, 436
Scabies, cattle, lindane for, 453
in sheep, 208
in sheep, BHC solution in, 76
Scanty rations no detriment to meat quality in calves, May-XXXVI
Schools of veterinary medicine, enrollment in, 32
Scours in dairy calves, aureomycin oblets for, 475
Scrap metals in urgent demand, 238
Scrapie in sheep, 518
Screwworm fly, radiation in fight on, Jan.-XXVI
Screwworm over-wintering, 298
Semen, bull, value of sulfanilamide on fertility of, 349
diluted chicken, 118
from turkeys, 75
frozen, survival time, 382
Serum jobbers, county agents and agricultural vocational teachers cannot act as, 31
Sewage, contaminated, Feb.-XXII
Sexing machine for chicks, 75
Sheep
see also Lambs
brucellosis in, 520
demyelinating diseases of, 385
dipping of, in benzene hexachloride (BHC) at public stockyards, 31
emetine chloride for lungworm infestation of, 434
ephedrine and antibiotics in mastitis of, 52
Johne's disease in, 165
lungworm infection in, 255
parasite control with phenothiazine, 477
production statistics, 102
safer drenching with carbon tetrachloride, 299
scab control, 7
scabies, 208
scabies in, BHC solution in, 76
scrapie in, 518
tick control, low pressure sprayers, June-XXXV
Shipping fever in cattle, 251
Shock, plasma extender for, 102
Shoeing horse lame from pyramidal disease, 36
Siesta, May-XXIX
Sinusitis, infectious, of turkeys, 39
Sludged blood, 133
Small animal clinic, analysis of income and expense, 306
Sodium acetate in acetonemia, 303
Sodium propionate in veterinary therapeutics, 165
Sodium silicate predisposes lambs to urinary calculi, 161
South American treatment of echinococcosis in dogs, 342
Southern V. M. A., 171, 474
Sows
see also Swine
castrating and fattening, 349
hormone treatment of, 450
Soy-bean oil meal poisoning, hemorrhages in, 105
Sperm transport, rapid, in the cow, 298
Speyer hospital mobile clinic, 84
Sponges, cellulose, 214
Spray materials, use cautiously, 384
Sprayers, low pressure for sheep tick control, June-XXXV
Stability of *Erysipelothrix rhusiopathiae* vaccine (desiccated), 27
Stark animal hospital, 160, 161
Stephanurus dentatus, of swine, 116
Sterility, antibiotics in, 185
cause of, 6
Stethoscope, improved, 168
Stomach, foreign bodies in, 208
Storrs Agricultural Experiment Station, grant to study encephalomalacia, 253
Streptococcic infections in pigs, 219
Streptococcic mastitis, streptomycin in, 233
Streptococcus agalactiae, resistance to antibiotics, 396
Streptomycin in the treatment of streptococcic mastitis, 233
in enteric disorders, 512
Studies of Newcastle disease and canine distemper viruses in puppies, 513
Successful treatment of dermatoses in small animals, 524
Sulfanilamide, value of, on fertility of bull semen, 349
Sulfaquinoxaline medication of chickens, 28
Sulfonamides, production of, 34
therapy, 298
Summary of observations at First Pan American Veterinary Congress, Lima, Peru, 103
Surgery, and diseases of the eye, 137
for milk fistula, 437
Surital sodium, and morphine anesthesia in canine surgery, 97
anesthesia, 138
Sutures, cotton, 141
Swine
see also Hogs
see also Pig and Pigs
see also Sows
anthrax outbreaks in, 274
atrophic rhinitis, 8, 247, 388, 515
belladonna poisoning in, 392
brucellosis control in a herd with valuable blood lines, 448
brucellosis in Illinois, 208
chemical stimulates weight gain, 184
edema disease of, 9, 247, 479
erysipelas, penicillin and vaccine treatment for, Nov.-XXX
erysipelas vaccine, new, 432
estrogens increase feed utilization and weight gain of, 77
garbage feeding, legislation on 517
hepatic cirrhosis in, 55
hog cholera vaccines, newer, 162
husbandry practices, 159
kidney worm, *Stephanurus dentatus*, 116
moldy corn poisoning in, Dec.-XXVI
lungworms, biology of, 38
nasal trichomonads in, 388
practice, 132
production, Jan.-XXXVI
protein requirements of, 389
rations, antibiotics in, 475
salt poisoning in, 436
stability of *Ery. rhusiopathiae* vaccine (desiccated), 27
transmissible diseases of, 9
vesicular exanthema in, 314, 353, 427, 471, 515, 516, 519

T

Taenia saginata treated with quinacrine hydrochloride, 520
Tail setting of horse, 34
Tapeworms, 343
ruminant, in lambs, 74
Tarweed, *Amsinckia intermedia*, as a factor in hepatic cirrhosis of swine, 55
Tax reserve, maintain, Mar.-XXII
Tax wasters, absurd, June-XXVIII
Teaching technics, 16
Teat, anesthesia of, 112, 385
surgery, 177
Television program, A.V.M.A. convention, 339
Telognosis, Apr.-XXVIII
Terralac for pigs, Sept.-XXXIV
Terramycin, hydrochloride, absorption, May-XXXVIII
new dosage forms announced, Jan.-XXV
therapy in virus diseases, 121
use in treatment of mastitis, 40
Testicular neoplasms—report of two cases, 79
Tetanus, immunity of foals to, 77
Texas, fever ticks, Apr.-XXXIX
Texas State V.M.A. meeting, Apr.-XXXIII
Therapeutic agents against *Fasciola hepatica*, 522
Thermometers, reuniting mercury column of, 209
Thoroughbred horses, sensitivity to drugs, 396
Tic douloureux, 432
Tick, cattle, parathion tested on, 38

control, sheep, low pressure sprayers, June-XXXV
paralysis, 72, Feb.-XXII
Texas fever, Apr.-XXXIX
Torsion of the stomach in the dog, 480
Toxaphene poisoning in dogs, 256
Toxicology, in canine medicine, 331
of common poisons, 412
of dieldrin, 74
Toxoplasmosis, an occupational disease, 479
Transmissible diseases, of poultry, 24
of swine, 9
Treatment, of cattle scabies with lindane, 453
of conditions affecting bovine fertility, 128
of feline infectious enteritis in a cat colony with antiserum and aureomycin, 327
of urinary calculi, 459
Trichinosis in man, cortisone for, 279
Trichomonas infection, new therapy for, 77
Trypanosomiasis-resistant cattle, 117
Tuberculin, preparation of, 473
U. S. BAI work with, 14
Tuberculosis, bovine, nonexistent in Finland, 254
diagnosis of bovine granulomas with reference to, 15
federal-state eradication project, 16
in a young Dachshund, 525
incidence, Oct.-XXV
new cures for, 342
survey, 73
toll of, 112
Turkeys
see also Poultry
breeders, artificial lighting of, 433
diseases, bulletin, 214
enheptin in blackhead of, 117
feed-gain ratio, 478
hens, response to light, Jan.-XXII
infectious enterohepatitis of, 388
infectious sinusitis of, 39
mating injuries in, 478
semen from, 75
Turkish veterinarians, Sept.-XXXVIII
Two outbreaks of hepatic cirrhosis in swine in California, with evidence incriminating the tarweed, *Amsinckia intermedia*, 55

U

Undulant fever victim wins judgment, 71
Unique type of radiation therapy in small animal practice, 151
University of Illinois circular on parasitism, 484
Unsuccessful attempt to treat avian monocytosis with antibiotics, 456
Urethra, rupture of, due to faulty emasculation, 256
Urinary calculi, 438
sodium silicate predisposes lambs to, 161
treatment of, 459
Urine, blood and milk concentrations of aureomycin, 367
changes in canicola infection in dogs, 389
from cattle and horses, simple method of obtaining, 120
USDA as a defense agency, 115
Use of, chloramphenicol (chloromycetin) for treatment of coccidiosis in dogs, 122
ephedrine and antibiotics in treatment of acute mastitis of sheep and cattle, 52
estradiol cyclopentylate (ECP) in slow or nonbreeding chinchillas, 212
U. S. Livestock Sanitary Assn., committee reports, 17-24
officers, 3
report of 55th annual meeting, 1

V

Vaccinates 1,000,000 calves, 114
Vaccination, against pneumoencephalitis (Newcastle disease) by atomization or nebulization in incubators and chick boxes with the B_1 virus, 364
of chickens against Newcastle disease, intramuscular and rectal, 101
Value of blood examinations in diagnosis of canine and feline diseases, 375
Vampire bat paralytic rabies in cattle, 502
Vectors and organisms, disease, interstate transport or import, 501
Vesicular exanthema, 314, 353, 427, 471, 515, 516, 519
Vesicular stomatitis, 518
Veterinarian and civil defense, 195
Veterinarian's bookshelf, 81
Veterinarians, can advertise, 394
entrance rank in Army Veterinary Corps, 381, 471
from Turkey, Sept.-XXXVIII
in public health work, 37
registration of, in Massachusetts, 35
responsibility in community's public health, 189
survey, of, 208
vacancies for, in the Air Force, 34
Veterinary, clinic, future, 136
congress, XVth international, Stockholm, 383, 514
Corps officers, 352
Corps officers, incentive pay for, 297
headlines during 1952, 515
interest items, 42, 84, 126, 168, 306, 352, 442
parasitology, 38, 74, 117, 252, 299, 345, 388, 434, 477
practice, business principles of, 293
science building at Wisconsin, 98
service to poultry industry, 406
symposium, Sept.-XLIII
volunteer list exhausted, 33
Viability of *Brucella melitensis* in naturally infected cured hams, 34
Vibrionic abortion, 85
Virus diseases, of dog: with special reference to infectious hepatitis, 282
terramycin therapy in, 121
Virus, modified living, immunization with, in rabies and hog cholera, 144
treatment, late, in hog cholera, 471
Vitamin A deficiency in, 75
Vitamin B_{12}, natural sources, 478
Vitamins, lyxoflavin, 34

W

Warfarin poisoning, of young pigs, 372
report on, 235
Warts, calcium sulfide in treatment of, 36
"Watch and report", 471
Water belly, 438
Western equine encephalomyelitis, 470
White blood cell count in hog cholera, 497
Wisconsin conference, 423, Nov.-XXVI
Women veterinarians, Sept.-XXXVIII
Women's V.M.A., Aug.-XXIV
Worms, esophageal, in a hound, 257
Wounds, surface, and otitis externa in small animals, 436

X

X-disease, of cattle, 342
(hyperkeratosis) produced experimentally, in Nebraska, 34
X-ray, machine, new, at M. S. C., Apr.-XL
therapy, 395

Y

Yellow fever, 386

Z

Zoo veterinarians meet, 374

INDEX OF NAMES

A

Adler, H. E., 456
Aitken, W. A., 114
Albritton, E. C., 260
Alston, J. T., 392, 437, Nov.-XXXII
Anderson, W. A., 15
Ashe, H. J., Mar.-XXII Dec.-XXXI
Atkeson, F. W., 323

B

Baker, E. T., 124
Baker, Gracia A., 461
Baker, J. A., Mar.-XXXVI, 115, Apr.-XXVIII, 188
Barner, R. D., 323
Barr, W. A. B., 247
Barron, H. T., 507
Basaron, M., Sept.-XXXVIII
Batte, E. G., Mar.-XXVIII, 172
Bayles, G. W., 80
Beadner, H. F., Sept.-XXXIV
Beam, F. M., 256, 304
Beattie, J. H., 451
Beccia, R. N., 440
Beeson, W. M., 296, Oct.-XXVI
Bell, W. B., 321
Belschner, H. G., 124
Bennett, P. C., 8
Berry, J. W., Nov.-XXXII
Beuschel, L. L., 352
Biester, H. E., 23
Bild, C. E., 247
Bjornson, C. B., Mar.-XXXIX
Black, Jack, 502
Blaine, D. P., 242
Boley, L. E., 267
Bowman, G. W., 10, 485
Boyd, A. G., 296
Boyd, W. L., Apr.-XXXIX, 336
Bozeman, S. R., Dec.-XXXVIII
Bradley, O. C., 166
Bramlet, R. G., 459
Bridenstine, W. A., 352
Bridges, B. F., 352
Brock, C., 138
Brown, H. W., 235
Brown, Joe, 341
Brueckner, A. L., 101, 181, 513
Brutsman, F. E., 293
Bryan, A. H., 461
Bunn, C. E., Mar.-XXVII
Burch, G. R., 26, 507
Burkhardt, B. S., 286
Burkhart, R. L., 12, 502
Burnet, F. M., Jan.-XXIV
Burriss, J. T., Oct.-XXVI

C

Cabasso, V. J., 417
Campbell, A. M., 28
Campbell, D. M., 2, 3, 169, 170
Carlson, W. E., 191
Carney, J. P., 43, 473
Carr, A. K., 176, 296
Carr, William, 33
Carver, J. S., 456
Casselberry, N. H., 11
Castleberry, M. W., 352
Chambers, E. E., 128
Christensen, J. F., 55
Christopher, B. C., 352
Claborn, H. V., 94
Clark, C. F., 339
Clark, C. H., 211
Clark, R. T., May-XL
Clarkson, M. R., 5
Coble, M. M., 261
Coffin, D. L., 33, 338
Cole, C. R., 140
Collins, J. H., Feb.-XXIII
Collopy, B. J., 52
Conrad, M. D., 438
Cook, James, Nov.-XXXIII
Cooperrider, D. E., 65
Cordy, D. R., 55
Cotton, C. E., 340
Cotton, Cornelia M., 40
Cotton, W. E., Jan.-XXXII
Crawford, F. W., Feb.-XL
Creamer, A. A., 424
Currey, J. R., 193
Curtis, Robert, 338

D

Dalling, Thomas, Nov.-XXV
Danks, A. G., 340
Davidson, J. L., 99, 239
Davis, C. L., 15
Davis, C. R., 101
Davis, H. P., 350
Davis, L. R., 10, 485
DeCamp, C. E., May-XXXVI
Dee, C. E., 127
Deubler, M. Josephine, 9, 182
Dick, J. R., 13
Dikmans, G., 199
Dimock, W. W., 443
Drury, A. R., 407
Duckworth, C. U., June-XXV
Dykstra, R. R., 36, 76, 116, 161, 251, 300, 342, 385, 432, 475, 520

E

Eads, F. E., 97
Easley, G. T., 280
Easterbrooks, H. L., 440
Ebert, E. F., 473
Eden, E. L., Jr., 382, 467
Elder, Cecil, 33
Emmerson, J. H., 151, 153
Emminger, A. C., Feb.-XXII
English, B. W., 35
Epstein, E. E., 123, 525
Eschenroeder, H. C., June-XL
Espe, Dwight, 440
Eveleth, D. F., 28

F

Farquharson, James, 34, 175
Fell, Patricia, 40
Fincher, M. G., 185
Firth, L. K., 161
Ford, C. M., 396
Foster, A. O., 38, 74, 117, 252, 299, 345, 388, 434, 477
Fowble, J. C., 206
Fowler, G. R., Nov.-XXVIII
Frank, Alan, 327
Frank, C. B., 352

G

Gadd, J. D., 171
Gale, John, 352
Garbutt, R. J., 509
Garrett, H. U., 24
Garverick, W. W., 261
Gates, D. W., 229
Gates, G. D., Nov.-XXXII
Geyer, H. G., 20
Gibson, K. S., 480
Gier, H. T., 390
Goldsby, A. I., 28
Goldschmidt, R. B., 440
Gonser, R. C., 161
Gorham, J. J., 461
Gouchenour, R. B., 27, Dec.-XXXVIII
Grahame, Tom, 166
Gross, W. B., 364
Guthrie, J. E., 307

H

Haas, K. B., Jr., 79, 394, Nov.-XXII
Haas, K. B., Sr., 394, Nov.-XXII
Hamilton, C. M., 456
Harvey, M. J., 12
Hendershott, R. A., 2
Henley, R. R., 14
Herrick, J. B., July-XXXI
Hilty, Reuben, May-XXXVIII
Hinshaw, E. R., 523
Hinshaw, W. R., 39, 75, 118, 164, 253, 344, 387, 430, 433, 478, 521
Hinze, P. M., Apr.-XXVIII, 158, 397
Hobby, G. L., May-XXXVIII
Hoerlein, A. B., 448
Hoffman, R. D., 177
Holm, G. C., 89
Hooper, Cherry Ann, 84
Huffman, C. F., 262, 263, 280
Hughes, R. H., 436

Husman, A. A., 171, 341
Hutchings, L. M., 17

I

Innes, J. R. M., 242
Isenberg, C. C., 352

J

Jasper, D. E., 55
Jenny, Jacques, 339
Jensen, H. E., 285
Jensen, Rue, 184
Johnson, E. P., 364
Jones, L. T., May-XL
Judy, Will, 292

K

Kearns, F. M., 171, 474
Kelser, R. A., 250
Kemper, H. E., 453
Kernkamp, H. C. H., 9
Kiesel, G. K., 346
Killinger, A. H., 13
Kiper, Ali, Sept.-XXXVIII
Klausman, B. S., 235, 524
Klussendorf, R. C., 288
Knisely, M. H., 133
Knowles, J. O., 141, June XXXVI
Knowles, R. P., 127, 136, 140
Koprowski, Hilary, 144, 502
Kuttler, A. K., 6

L

Labudovich, M. E., 52
Ladson, T. A., 40
LaFond, L. H., 292
Laitinen, Edwin, 338
Leader, R. W., 461
Leaming, J. D., 12, 451
Leith, T. S., 448
Lightfoot, J. W., Feb.-XXVI
Lind, R. B., 161
Lineweaver, H. O., 101
Little, R. B., 341
Lorber, M. G., 121
Lovett, R. A., 352

Mc

McAdory, I. S., Oct.-XXII
McAuliff, J. L., 78
McCallam, J. A., May-XXX, 337
McChesney, A. E., 336, 339
McLeod, J. A., 166

M

MacNabb, A. L., Apr.-XXXVI
Magrane, W. G., 137
Majilton, E. A., 122
Manthei, C. A., 179
Mason, L. K., 166
Maxey, H. C., 352
Mayo, Bob, Nov.-XXXII
Merchant, I. A., 248, 260, 350
Merrill, S. D., 405
Meyer, K. M., 80
Milaknis, Anthony, 79
Millar, J. A. S., 339
Miller, R. A., 392
Milligan, J. G., 124
Milne, F. J., May-XXV
Milo, H. A., May-XL
Mohler, J. R., Apr.-XXVI
Morse, E. V., 48
Munch, J. C., 331
Murray, G. H., 467

N

Newberne, P. M., 41, 212
Newberry, W. E., 390
Newkirk, H. L., 258
Newsom, I. E., 214
Nickerson, W. J., 94
Nord, S. D., 375
Noyes, L. R., 4
Nunn, J. R., 256
Nusser, W. A., 352
Nutter, R. M., 151, 153

O

Oberst, F. H., 323
O'Rourke, W. J., 482
Orum, A. M., 337
Owens, J. L., Feb.-XXVI, May-XXX
Owens, Mrs. J. L., May-XXX

P

Packer, R. A., 350
Payne, L. C., 114
Peck, G. K., 359
Percival, R. C., 12
Perry, T. G., 221
Petersen, W. E, 367
Peterson, H. O., 453
Pexton, L. M., 6
Phifer, W. G., 352
Phillips, L. R., 286
Phillips, W. V., 78
Pickett, Deets, 112, 212
Pinkerton, H. E., 13
Piper, G. A., 303
Plastridge, W. N., 440
Plegge, C. R., June-XL
Pomeroy, B. S., 270, 280
Poppenhouse, G. C., 210, 4
Poppensiek, G. C., 282
Porter, D. A., 485
Pounden, W. D., 338, 340
Prier, J. E., 52, 85, 459
Prother, E. R., 352

Q

Quin, A. H., 132, 159, Sept.-XXXVIII
Quinlan, J., 396

R

Radeleff, R. D., 94
Randle, John, Nov.-XXXII
Ray, J. D., 9, 219
Reagan, R. L., 101, 513
Reihart, Helen W., 372
Reihart, O. F., 372
Reinhard, K. R., 106
Rice, W. M., Aug.-XXXII
Riley, W. F., 338
Rodgers, C. M., July-XXXIV, 262
Rogers, Herbert, 229
Rongren, R. G., May-XL
Rosenberger, J. H., 469, 473
Ross, H. H., Oct.-XXV
Ruggles, R. E, Apr.-XXVIII, 161, 214, 238, 306

S

Sampson, Jesse, 58
Sanders, D. A., 127
Scatterday, James, 189
Scheidy, S. F., 59
Schilling S. J., Sept.-XXXVIII
Schipper, I. A., 367
Schmidt, E. G., 233
Schmidt, Eleanor, 48
Schmidt, F. F., May-XXIX
Schmidt, H., 24
Schnelle, G. B., Mar.-XXVIII, 113, Apr.-XXXIX, 285
Schoenberg, F., 484
Schondelmeyer, W. L., 79
Schroeder, C. R., 12, 21, 502
Schulz, C. W., Nov.-XXVIII, 473
Schwartz, Benjamin, 22
Scott, J. P., Sept.-XXXVIII
Seiden, Rudolph, 214
Serling, M. E., 155
Shaffer, J. J., Apr.-XXIII
Shahan, M. S., 5
Shaw, B. T., Feb.-XXXV
Sheran, Esad, Sept.-XXXVIII
Shockey, Laurence, 438
Shopmaker, A. B., 525
Shore, H. J., Aug.-XXVI
Simon, Joseph, 233
Sippel, W. L., 497
Smith, Edith, 48
Smith, Stanley, 382
Smith, V. R., 440
Spence, C. K., 41
Spencer, G. R., 233
Spencer, J. N., 377
Sperry, J. R., Aug.-XXXV
Spieth, E. W., 261
Spivey, D. T., 35
Stabler, W. L., Nov.-XXXII
Stafseth, H. J., 21
Starr, L. E., 23
Steele, J. H., 37, 78, 103, 163, 166, 254, 301, 343, 386, 416, 435, 476
Stefferud, Alfred, 484
Stein, C. D., 229, 274, 315
Stephens, Seidel, 352
Stephenson, W. J., 348

Stevenson, L. C., Jan.-XXV
Stocking, G. G., 99
Stone, E. C., 383
Stoner, Margaret G., 274, 315
Stroup, W. L., Nov.-XXXII
Stuart, W. R., 302
Sullivan, W. G., 352
Sussman, Oscar, 14
Sutter, Max, Nov.-XXXIII
Swanson, L. E., 172

T

Taurikut, Sadi, Sept.-XXXVIII
Tedder, P. W., 257
Thom, M. A., 249, 395
Thomas, E. F., 142
Thomas, J. E., 436
Thomas, K. J., 424
Thomas, R. M., 52, 459
Thorp, W. T. S., 195
Todd, A. C., 25
Tucker, F. C., 33
Twiehaus, M. J., 105

V

Van Drimmelen, G. C., 9
Van Roekel, H., 24
Veliz, M. O., 321
Vigue, R. F., 215, 491

W

Wadsworth, J. R., 412
Waksman, S. A., 519
Walker, E. C., 440
Walker, W. W., 11
Wasman, S. C., 139
Weaver, G. L. H., 338
Wells, J. R., 297
Wells, R. W., 94
Welsh, Mark, 12
Werntz, O. G., 352
West, R. L., 1
Wheeler, A. C., Apr.-XL
White, E. A., 339
Whitehair, C. K., June-XXX
Wicktor, C. E., 35
Williams, L. F., 440
Williamson, R. L., 13
Willoughby, Ray, 7
Wilson, J. B., 396
Winslow, C. E. A., 416
Winter, Asa, 16
Wirth, David, 440
Wood, D. C., 6, 72
Woolsey, J. H., Jr., 55
Wordle, R. A., 166

Y

York, C. J., 13, Apr.-XL, May-XXIX, Nov.-XXVIII
Yotter, E. S., 27
Young, Mrs. E. W., May-XXX
Young, W. A., Apr.-XXIII
Young, W. C., Jr., 97

Z

Zeissig, Alexander, 96, 512, 517
Zinn, Robert, Jan.-XXXVI

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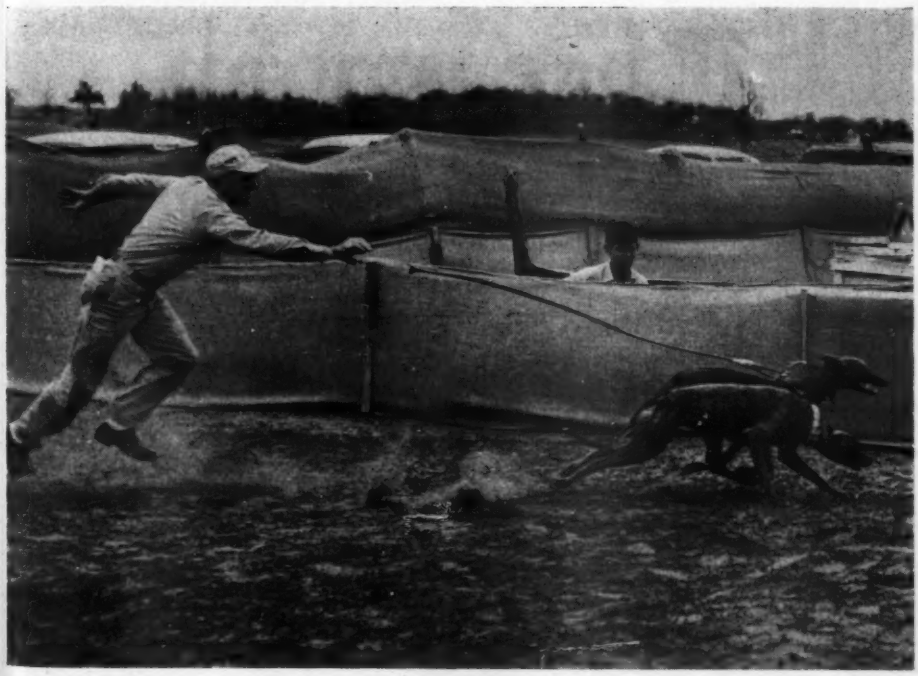

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- Non-corrosive and bleaching
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- Use cost low

Therapogen is remarkably useful as a cleansing wash in instances of inflammation or suppurative conditions of the eye. In distemper when discharges from the nose or eyes occur, it is also excellent as a cleansing agent.

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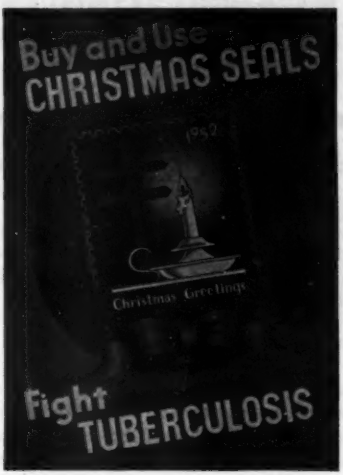

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During the fiscal year ending June 30, 1952, 215,389 dairy calves and 128,739 beef calves, or a total of 344,128, were vaccinated in California under the brucellosis control program.

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The most important disease of swine is hog cholera.—*W. A. Aikens, D.V.M.*

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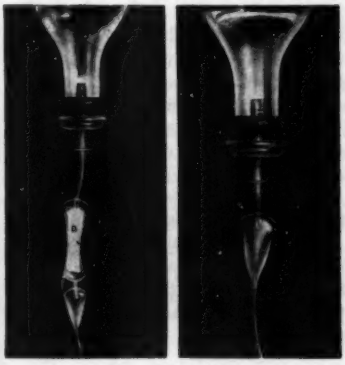
A 3-function dispensing closure that simplifies the administration of intravenous fluids and blood, and serves as a vacuum seal in the preparation of sterile solutions.



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Disposable Dispensing Sets for the administration of intravenous solutions and blood. Both Fluids and Blood Sets may be used with all types of conventional closures as well as the recently devised Fenwal Blood Pack*.

Permits Better Control of Flow

Infusion time can be reduced by completely filling Filter Chamber (D) with blood before starting the transfusion. This is readily done by gently squeezing the plastic filter. The flexible character of both filter and drip chambers affords a means of creating most favorable conditions for steady, uninterrupted results.

The Fenwal Plastic Filter Chamber may be gently squeezed to free or break up any blood clots that may tend to clog at the outlet tube or needle.

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The stem of the Tel-O-Vac Seal is fabricated to include a 2-way air vent (A) and inside strainer (B) as illustrated. Note supporting ring (C) which establishes the proper point at which the Seal should be set prior to attachment of Fenwal Universal Sets.

*Sack, Theodore et al, The Preservation of Whole ACD Blood Collected, Stored, and Transfused in Plastic Equipment, Surg. Gyn. Obst.: 95, 113-119, 1952.

Walter, Carl, W. A New Technic for Collecting, Storage and Administration of Unadulterated Whole Blood. Surgical Forum.

Walter, Carl W., and Murphy, Wm. P., Jr., A Closed Gravity Technic for the preservation of Whole Blood in ACD Solution utilizing Plastic Equipment. Surg. Gyn. Obst.: 94, 687, 1952.

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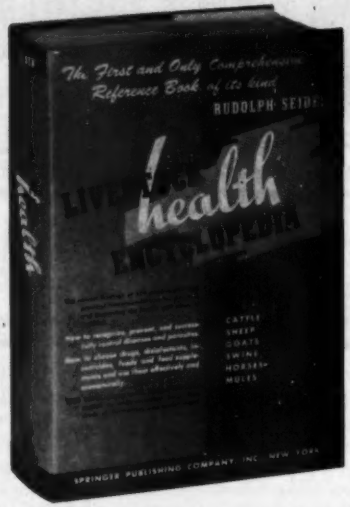

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Moldy Corn Poisoning in Swine

Preliminary report of an investigation of a disease condition affecting pigs in southern Georgia has been made by members of the staff of the Georgia Coastal Plains Experiment Station, Tifton.

Pigs exhibiting symptoms of icterus have been studied. Lesions at autopsy have been primarily those of extensive hemorrhages and liver changes. Cultures reveal a predominance of fungi tentatively diagnosed as belonging to the Aspergillus group. Mortalities extending over a four-week period were reported in test pigs fed suspected ground corn.

▾ ▾ ▾

Study Course in Veterinary Mycology

Laboratory diagnostic methods in veterinary mycology designates a course of study designed to familiarize veterinarians, laboratory directors, and technicians with procedures for detecting, isolating, and identifying the fungi which produce mycotic infections of public health importance in lower animals.

Those interested should address the Parasitology and Mycology Laboratories, Laboratory Branch, Communicable Disease Center, Chamblee, Ga., for the outline of the course. Dates are January 5-9, 1953. Class will be limited to 22 students.

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Keep Those Receipts

HAROLD J. ASHE

If you have never been called on to pay a bill twice, you are probably in the fortunate minority. Every professional and business transaction involves the possibility, no matter how remote, that it will form the basis for disagreement between seller and buyer on the score of alleged non-payment. Many of these instances represent honest difference of belief between two disputing parties which could be amicably resolved by receipts.

While it is true the creditor is under obligation to exercise every possible precaution to see that payment is credited to a debtor's account, the debtor too has a responsibility in the matter. It is up to him to obtain evidence of payment and retain it in such a manner as to make proof of payment readily available.

"Your Honor, I remember paying that bill because that was the day my wife had triplets," may have a ring of sincerity about it. Even triplets, however, can't substitute for a receipted bill.

Clear in his own mind that his obligations have been discharged, a veterinarian may be extremely careless with receipts. Once entered in his account book, these receipts may be widely scattered, and many may be lost. It is not safe to assume that because a creditor does not present a new bill within a short time that credit on an account has been given.

It is wise to retain all receipts for at least the number of years in which collection by law can be enforced. This varies in different states, and ranges from a minimum in some states of three years on open accounts to as much as 16 years on contracts.

Also, it should be noted that insofar as paid bills represent professional expenses or income tax deductions, evidence of payment should be retained to support claims reflected in income tax returns. Where fraud is suspected in a taxpayer's return there is no limitation on how far back the government can go in examining records.

Even where a veterinarian maintains adequate records on his practice, he is frequently derelict in keeping records on income properties, other income sources, and personal expenditures. He may not have even as little as a book entry in lieu of lost receipts.

For a fact, this writer knows from personal observation, that few professional men reflect all expenses incident to income property on which they pay income taxes. That is, to the

(Continued on page XXXIII)

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HOG CHOLERA control always has been the veterinarian's greatest responsibility. The difference between profit and loss in the swine industry depends on his professional knowledge and skillful administration of dependable biological products. That's why Grain Belt Supply Company directs every effort to supply him with only the finest quality Serum and Virus . . . a product that has been proved by time and has achieved nearly 100% effectiveness against the ravages of hog cholera. We are proud of the part we have played in keeping the veterinarian on the winning side of the fight. Grain Belt Serum and Virus is a dependable ally of the veterinarian . . . a clinical weapon of the highest quality.

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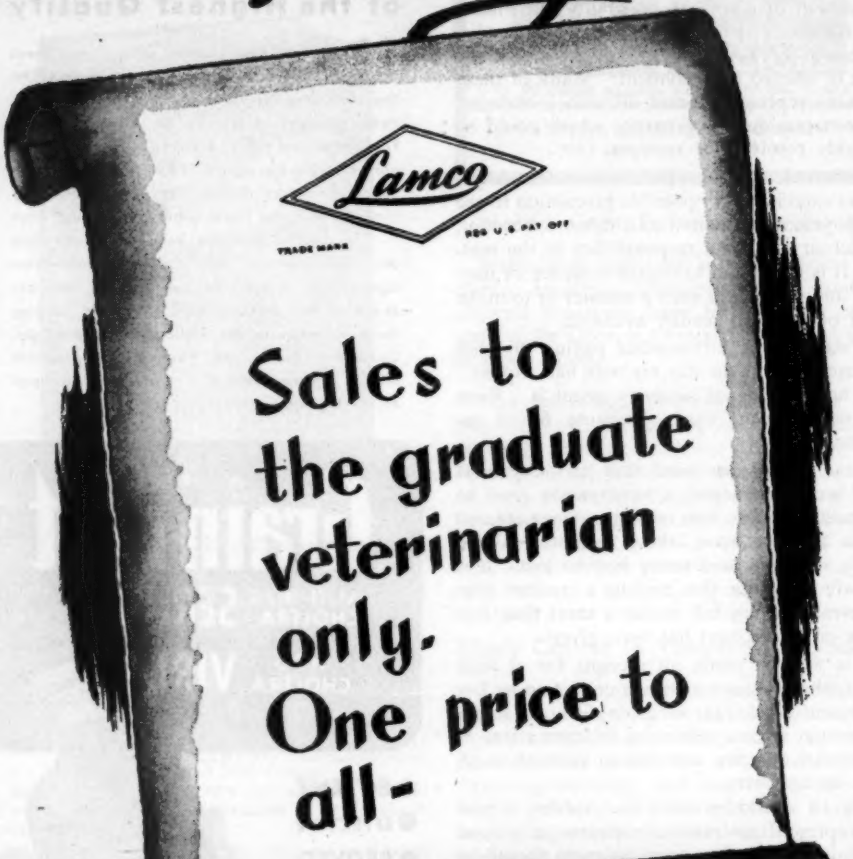

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(*Continued from page XXXI*)

extent that expenses are understated, net income is overstated, as are income taxes.

Receipts, unless carefully segregated, have a way of getting mislaid or permanently lost. They slip behind desks, lodge between other records, repose among personal effects, or, on occasion, get filed in wastebaskets. Unless a plan for preserving receipts is instituted, it is impossible to overestimate the likelihood of their going astray. Yet, the busy veterinarian cannot usually set up a complicated system to keep receipts where they can be located easily when wanted.

Here is a simple system which requires a minimum amount of time and which will ensure receipts being on hand when needed. Once routine is established and becomes automatic, additional time necessary to safeguard receipts may involve only five or ten minutes weekly at the desk.

Each bill should be identified as to the method of payment immediately it is paid. If paid by check it should be marked "paid by check number ———"; if paid by cash, this fact should be noted. If the bill is paid out of a cash box, the paid bill should be placed in the box until the end of the day in lieu of the cash removed. Otherwise, it will be impossible to reconcile the cash with starting cash and the day's cash receipts. However, if not paid by cash, the receipt should not be deposited in the cash box.

No pay-out should be too small to warrant a receipt. However, if the veterinarian disdains receipts for small pay-outs, he should make a memo showing what the pay-out is for.

After the cash box is reconciled, if one is used, the cash-paid receipts should be placed with receipts of bills paid for by check. This may be a box or folder kept for that purpose. These should be posted every day or so. Thus, if all receipts are carefully kept they will accurately reflect all expenses paid during a given period, and will be identical with the account book.

It should be noted that if any receipts are lost before being entered, this not only poses the danger of paying a bill a second time, but such lost receipts (if paid by cash) will not show up as expenses. Expenses, then, will be understated by the amount of such lost receipts. This will inflate net earnings—and the amount of the income tax bill.

Having posted paid bills, they should be pasted in a loose-leaf binder in the exact order

(*Continued on page XXXV*)

a NEW Package of 500's PLUS an impressive price reduction

MASTICS®

The Original Udder Bougie

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HIGH POTENCY DOSAGE FORM

containing 100,000 units of penicillin in each individually foil-wrapped bougie.

		Now Only
	25's	$4.75
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NEW Package of	500's	80.00

With staphylococcic infection moving into No. 1 position as the causative factor in bovine mastitis, penicillin remains the most effective drug for prophylaxis and treatment.

Now, with these new low prices for High Potency Mastics, you can help the farmers in your community by advising them to:

- Treat the infected cow at drying-off for the highest percentage of cures in cases intractable during lactation*, and for the least loss of milk.
- Treat all four quarters in all cows going dry, to prevent flare-ups of dormant infections and guard against spreading to uninfected quarters.
- Administer 200,000 units of penicillin per quarter in divided doses*—one High Potency Mastic followed by a second Mastic 48 hours later—for increased production of better quality milk when the cow freshens.

*Schalm, O. W., and Ormsbee, R. W.: J. A. V. M. A. 115:464 (Dec.), 1949.

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AUREOMYCIN Hydrochloride Crystalline closely approaches complete perfection for an antibiotic and has been proven to be highly effective against bacterial, rickettsial, protozoal and large virus infections.

Prompt clinical response and rapid reduction of temperature and remission of symptoms; uneventful recoveries; ease of administration; intervals between dosing that permit minimum handling; low toxicity that permits variable dosage adjusted to the type of infection; little tendency toward the development of resistant bacterial strains, and a broad spectrum of activity are all logical reasons why this versatile antibiotic should be used whenever infections suspected to be caused by aureomycin-susceptible organisms are to be treated.

AUREOMYCIN *Lederle* is available as:

AUREOMYCIN OBLETS* Veterinary — tablets containing 500 mg. of Aureomycin Hydrochloride Crystalline for topical therapy and prophylaxis by insertion into body cavities; ideal for retained placenta and endometritis. 500 mg. — Jars of 4.

AUREOMYCIN-T.F. (Therapeutic Formula) Aureomycin and B_{12} Veterinary — for the therapy and prophylaxis of enteric diseases of swine, including coccidiosis, vibrio dysentery, salmonellosis, and baby pig white diarrhea. 1 pound and 10 pound containers.

AUREOMYCIN Crystalline INTRAVENOUS Veterinary — for horses and cattle; and for *all animals* showing evidence of septicemia, or bacteremia, caused by aureomycin-susceptible organisms, when immediate establishment of therapeutic blood levels is indicated. 100 mg. vial with 10 cc. vial Water for Injection; 500 mg. vial with 50 cc. vial Water for Injection; 2.5 Gm. vial with 250 cc. vial Water for Injection.

AUREOMYCIN Crystalline CAPSULES Veterinary — for dogs, cats, fur-bearers, and calves not yet ruminating. 50 mg. vials of 25; 250 mg. vials of 16; bottles of 100.

AUREOMYCIN Crystalline OINTMENT — for superficial infections of the skin, and about the ears and eyes. 30 mg. per Gm. — 1 oz. applicator tubes.

AUREOMYCIN Crystalline OINTMENT for Udder Infusion Veterinary — for mastitis and prophylaxis of mastitic infections. 60 mg. per Gm. — ¼ oz. applicator tubes.

Other aureomycin products adaptable to veterinary use include: AUREOMYCIN Otic, AUREOMYCIN Ophthalmic SOLUTION, AUREOMYCIN Ophthalmic OINTMENT (1.0%), AUREOMYCIN OINTMENT (3%) and AUREOMYCIN Surgical POWDER.

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(*Continued from page XXXIII*)

in which they have been paid and entered in the account book.

Stubs of check books should clearly indicate what each check has been drawn for. They should be compared with bills to make certain all expenses show in the loose-leaf receipt book. If no bill is available to match a check, a memo should be pasted in the proper sequence, referring to the check by its serial number. In this way, the receipt book not only contains paid bills and receipts but also indicates pay-outs receipted for only by check. This gives a complete picture of professional expenses. Depending upon circumstances, one of these binders may suffice for six months or a year, and become an integral part of the bookkeeping system.

If employees are paid by cash, receipts should be obtained, and these should also be pasted up. The same is true of casual labor and services from those not ordinarily presenting bills or giving receipts. This may prevent an appearance in small claims court or before a state labor commissioner.

In accepting receipted bills, make certain the full date is shown, not just the day and month, as is frequently the case on hastily prepared bills and receipts tendered.

Where open accounts are run, it may be wise to periodically pay off such accounts in full and demand "paid in full to date" receipts. It is legally difficult for a creditor to go back of a "paid in full" receipt.

Where the purchase of capital assets, professional or investment, are involved, it may be wise to keep a separate receipt book. This can prove useful in establishing the value of such assets, such as rental properties, furnishings, office equipment, etc., and eliminating later "guesstimating" of cost. It is invaluable in establishing depreciation tables for purposes of an income tax return. It may help to pre-

(*Continued on page XXXVI*)

tells the story of B-P RIB-BACK BLADES

B-P RIB-BACK BLADES are the result of a constant endeavor to provide the surgeon with quality-controlled blades, having uniformly sharp and enduring cutting edges that he can depend on for maximum service performance. That is why . . . when you figure your blade purchases in terms of *true economy* . . . the answer is always "IT'S SHARP" — B-P Rib-Back Blades.

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Write for Descriptive Price Sheet of Veterinary Dispensing Products.

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(Continued from page XXXV)

vent expensive oversights in depreciation write-offs. It can be equally valuable in establishing replacement values in event of fire insurance adjustments.

If a veterinarian has income property, it may be a good idea to set up a separate receipt book and receipt routine. Such receipts should certainly not be commingled with professional expenses in a professional receipt book. During the course of a year, many and varied expenses arise in connection with income property and it is easy to dribble away hundreds of dollars in expenses without leaving any trace, if receipts are not carefully kept and segregated.

Bills and memoranda should be pasted lightly at upper corners so that, in case of dispute, they may be removed without damage and be shown as evidence of payment.

▾ ▾ ▾

Combinations of streptomycin and penicillin are favored antibiotic agents of some practitioners, particularly in the treatment of mixed uterine infection and bovine mastitis.

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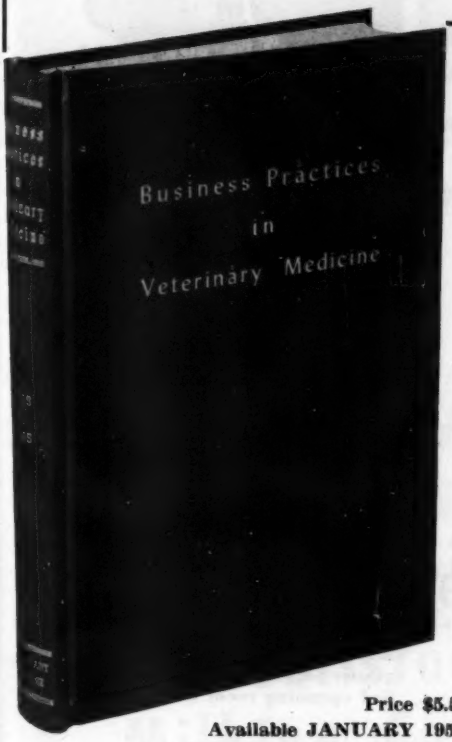

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May be mixed with the feed in the proportion of 1 tablespoonful per day for large animals and 1 teaspoonful per day for small animals, or 1 pound to each 100 pounds of ground or mash feed which is fed regularly. May be offered in a self-feeder, much in the same manner as a salt-lick, so that the animals may obtain it ad libitum.

Doz. 1 pound	$4.80	½ doz.	$27.00
25 lb. drum	5.25	100 lb. drum	18.00

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Dr. W. S. Gochenour, formerly director of the Pitman-Moore Biological Laboratories, Zionsville, Ind., has been named vice-president in charge of veterinary relations. He will be located at the headquarters offices in Indianapolis. Dr. Samuel R. Bozeman will succeed Doctor Gochenour as director of the Zionsville plant.

▼ ▼ ▼

COMING MEETINGS

Animal Care Panel. Annual meeting. University of Illinois, Chicago Professional Colleges, Chicago, December 3-4, 1952. Bennett J. Cohen, Northwestern University Medical School, 303 E. Chicago Ave., Chicago 11, secretary.

Arizona Veterinary Medical Association. Annual meeting. San Marcos Hotel, Chandler, Dec. 4-6, 1952. George S. Calderwood, 570 N. Arizona Ave., Chandler.

Maryland State Veterinary Medical Association. Annual winter meeting. Lord Baltimore Hotel, Baltimore. Dec. 5-6, 1952. John D. Gadd, Cockeysville, secretary.

Kentucky Veterinary Medical Association. Conference and short course for veterinarians. Animal Pathology Building, University of Kentucky, Lexington, Dec. 10-11, 1952. T. J. Stearns, Room 216, Live Stock Exchange Building, Louisville, secretary-treasurer.

University of Pennsylvania. Annual conference for veterinarians. School of Veterinary Medicine, University of Pennsylvania, Philadelphia, Jan. 6-7, 1953.

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2 **Spill blade on sterile surface and affix to A.S.R. Handle.**

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Ohio State Veterinary Medical Association. Annual meeting. Deshler-Wallick Hotel, Columbus, Jan. 7-9, 1953. F. J. Kingma, Veterinary Laboratory, Ohio State University, Columbus 10, secretary.

Wisconsin Veterinary Medical Association. Annual meeting. Schroeder Hotel, Milwaukee, Jan. 7-9, 1953. B. A. Beach, University of Wisconsin, Madison, secretary.

New York State Veterinary College. Annual conference for veterinarians. New York State Veterinary College, Cornell University, Ithaca, Jan. 7-9, 1953. W. A. Hagan, dean.

Tri-State (Mississippi, Arkansas, Tennessee) Veterinary Conference. Bi-annual meeting. Hotel Peabody, Memphis, Tenn., Jan. 12-13, 1953. Quentin R. Jerome, 136 S. 10th St., West Memphis, Ark., secretary.

Oklahoma Veterinary Medical Association. Annual meeting. Biltmore Hotel, Oklahoma City, Jan. 12-13, 1953. Lewis H. Moe, Oklahoma A. & M. College, Stillwater, secretary.

Indiana Veterinary Medical Association. Annual meeting. Hotel Severin, Indianapolis, Jan. 14-16, 1953. W. W. Garverick, Zionsville, secretary.

Ontario Veterinary Association. Annual meeting. Chateau Laurier Hotel, Ottawa, Jan. 14-16, 1953. R. V. L. Walker, 438 Piccadilly Ave., Ottawa, chairman.

Intermountain Veterinary Medical Association. Annual meeting. Newhouse Hotel, Salt Lake City, Utah, Jan. 19-21, 1953. H. F. Wilkins, Montana Livestock Sanitary Board, Helena, Mont., chairman, program committee.

Iowa Veterinary Medical Association. Annual meeting. Des Moines, Jan. 20-22, 1953. F. B. Young, Waukee, secretary.

Michigan State College. Annual postgraduate conference for veterinarians. Michigan State College, East Lansing, Jan. 21-22, 1953. G. R. Moore, Department of Surgery and Medicine, chairman.

Texas State Veterinary Medical Association. Annual meeting. Baker Hotel, Mineral Wells, Jan. 26-27, 1953. Al Price, 101 Veterinary Anatomy Building, College Station, executive secretary.

Minnesota State Veterinary Medical Society. Annual meeting. Nicollet Hotel, Minneapolis, Jan. 26-28, 1953. B. S. Pomeroy, St. Paul 1, secretary.

California State Veterinary Medical Association. Midwinter annual meeting. Davis, Jan. 26-28, 1953. W. J. Zontine, 1014 Yucca Ave., Lancaster, program chairman.

North Carolina Veterinary Conference. North Carolina State College, Raleigh, Jan. 27-29, 1953. C. D. Grinnells, North Carolina State College, Raleigh, chairman.

Illinois State Veterinary Medical Association. Annual meeting. Hotel Sherman, Chicago, Jan. 28-30, 1953. A. G. Misener, 6448 North Clark St., Chicago 26, secretary.

Louisiana State University. Annual conference for veterinarians. Louisiana State University, Baton Rouge, Feb. 3-4, 1953. W. T. Oglesby, head, Department of Veterinary Science.

Colorado A. & M. College. Annual conference for veterinarians. Colorado A. & M. College, Fort Collins, Feb. 16-18, 1953. O. R. Adams, Director of Clinics.

Missouri Veterinary Medical Association. Annual meeting. Hotel Jefferson, St. Louis, Feb. 23-24, 1953. J. L. Wells, P. O. Box 676, Kansas City, secretary.

American Veterinary Medical Association. Annual meeting. Royal York Hotel, Toronto, Canada, July 20-23, 1953. J. G. Hardenbergh, 600 S. Michigan Ave., Chicago 5, Ill., executive secretary.

INDEX TO ADVERTISERS
In This Issue of Veterinary Medicine

While every care is exercised in the preparation of this index to assure accuracy, the publishers cannot guarantee against the possibility of errors or omissions.

Albany Serum Company, The XXXVI
American Safety Razor Corporation XXXVIII
Armour Veterinary Laboratories VII
Ashe Lockhart, Inc. ..... XLII-XLIII
Associated Serum Producers, Inc. 526
Austin Laboratories, Inc. XXX
Babson Bros. Co. XXXIX
Bard-Parker Co., Inc. XXXV
Carter-Luff Chemical Co. XXXVI
Chatham Pharmaceuticals, Inc. VI
Corn States Serum Company ..... Fourth Cover
Curts-Folse Laboratories XXXVIII
Cutter Laboratories XVI
Dairy Remedies Co. XXII
Dalare Associates XLI
Desitin Chemical Company X
Durst & Co., Inc., S. F. XIV
Fort Dodge Laboratories ..... IV-XIX
Fromm Laboratories, Inc. XXVIII
Gaines Food Company XV
Grain Belt Supply Company XXXI
Haver-Glover Laboratories XLIV
Jensen-Salsbery Laboratories, Inc. ..... Second Cover
Kinney & Company XVIII
Lederle Laboratories Division XXXIV
Macalaster Bicknell Parenteral Corp. XXV
Martin Laboratories, Inc. XXXIII
Mason Fence Co., Inc. XXV
Meyer Est., Theodore XXII
Mosher Company, L. A. XXXII
Norden Laboratories XVII
Nutritional Minerals XXXV
Parke, Davis & Co. III
Pfizer & Co., Inc., Chas. XXIX
Pitman-Moore Company XX
Ralston Purina Company IX
Sharp & Dohme V
Springer Publishing Company, Inc. XXV
Squibb & Sons, E. R. ..... XII-XIII
Sterling Research Corporation XXVI
Upjohn Company, The XI
Vitamineral Products Co. XXIII
White, George R. XXVI
Winthrop-Stearns, Inc. ..... Third Cover
Wyeth, Inc. XXVII

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A.S.P. Veterinary Public Relations to be Extended in 1953

Announcement has just been released that the Associated Serum Producers (A.S.P.), through its public relations bureau known as the American Foundation for Animal Health, has voted the largest budget in its history for continuation of the nation-wide public relations campaign on behalf of the veterinary profession during 1953.

Organized in 1934, member companies of the A.S.P. planned the program which has been continuous since that time. Objectives have been: (1) to alert stockmen to animal disease hazards; to provide information on the value of modern veterinary service for prevention of losses due to disease; to familiarize the general public with contributions made by the profession toward the assurance of public health and national welfare; and to encourage the grower of livestock to seek the best qualified advice available in his community for disease control and management matters.

Program Details

Twice-monthly news releases will be directed to 3,500 newspapers across the country. In addition, 1,800 weekly papers will be supplied a series of Question and Answer columns on current animal health topics.

Thirteen farm magazines, reaching over 6,000,000 readers per issue, will receive a series of educational advertisements which will feature animal disease hazards and the value of public veterinary service. News releases will also be provided twice monthly.

Over and above this, a special campaign of paid advertising, emphasizing the importance of vaccination procedures to protect swine from the ravages of hog cholera, will appear in a large group of Midwest publications, some of which have national circulation.

Over 400 radio stations will be furnished timely bulletins and news items. All of these will stress the value of diagnosis and professional service of practitioners trained in the science of animal disease.

Member companies of the A.S.P. pledged to underwrite costs of this program are: Allied Laboratories, Inc., Blue Cross Serum Co., Corn Belt Laboratories, Inc., Fort Dodge Laboratories, Inc., Grain Belt Supply Co., Jensen-Salsbery Laboratories, Inc., Liberty Laboratories, Missouri Valley Serum Co., Norden Laboratories, Pitman-Moore Co., Sioux City Serum Co., Sioux Falls Serum Co., The Columbus Serum Co., The Corn States Serum Co., The Gregory Laboratory, Inc., The National Laboratories Corp., The Royal Serum Co., The Southwestern Serum Co., and The United Serum Co.

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Antiseptic **Astringent**

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—DEATHS OF VETERINARIANS—

Otto C. Alspach, Marion, Ohio, GR RAP '11, died July 23, 1952.

Thomas O. Anders, Seattle, Wash., OSU '03, died May 10, 1952.

Oreste E. Barr, Barre, Vt., ONT '08, died August 30, 1952. Doctor Barr had been in practice in Barre for 44 years.

Bryce B. Binnall, Baldwin Park, Calif., KCVC '18, died July 2, 1952. Doctor Binnall had retired in 1947, because of poor health.

Albert E. Bryant, Menomonie, Wis., OVC '93, died August 7, 1952.

William M. Carlisle, Hickory, Pa., CVC '18, died August 1, 1952, after a long illness.

Glenn R. Dunning, Memphis, Mich., GR RAP '06, died April 20, 1952.

Albert J. Erickson, Tustin, Mich., WEST '05, died October 27, 1951.

Benjamin W. Groff, Massillon, Ohio, OVC '98, died in May 1951.

Ernest D. Harris, Fort Pierce, Fla., OSU '08, died September 2, 1951.

Raymond Emory Hittle, Philadelphia, Pa., KCVC '16, died May 4, 1952. At the time of his death, Doctor Hittle was president-elect of the Dairy Technical Society.

R. D. Holeman, Enid, Okla., KCVC '17, died August 21, 1951, following a heart attack.

Virgil R. Homan, Sugar Grove, W. Va., IND '18, died May 1, 1952.

Leo A. Hosbein, Coloma, Mich., GR RAP '12, died July 7, 1952.

Rudolph H. Mohlenhoff, Cleveland, Miss., CVC '91, died March 29, 1952.

S. W. Neeley, Toledo, Ohio, OSU '27, died August 23, 1952. Doctor Neeley had been associated with the Toledo Health Department for 20 years.

Franklin L. Parse, Foxworth, Miss., IND '07, died September 6, 1952. Doctor Parse had been in practice in Foxworth for 39 years.

Ernest A. Shikles, Dearborn, Mo., CVC '11, died June 27, 1952.

Milton Spiegel, Farmingdale, L. I., CORN '39, died July 1, 1952, following a heart attack. Doctor Spiegel had served as president of the Long Island Veterinary Medical Association.

J. E. Stansbury, Athens, Ohio, MC K '06, died July 30, 1952.

PASTEURELLA ANTISERA

It is recognized that Pasteurella organisms play an important part in the losses incident to shipment or exposure of cattle. The probability of a primary virus cannot be overlooked. For this reason, Anti-Hemorrhagic Septicemia Serum (Lockhart) and Anti-Corynebacterium Pasteurella Serum (Lockhart) are produced from mature cattle, proved to be immune to the complexes of "shipping fever." This PLUS VALUE accounts for the superiority of results obtained.

In those areas where infection by Corynebacterium is an important complication, Anti-Corynebacterium Pasteurella Serum (Lockhart) is recommended.

Either serum packaged in 100 cc., 250 cc. or 500 cc. size, single or multiple packages.

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COMBEX® *Kapseals*®

For prevention and correction of vitamin B deficiencies. Useful for animals requiring large amounts of vitamin B factors, in anorexia of dietary origin, pregnancy and lactation, febrile illnesses, convalescences, and restricted diets.

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Vitamin B_1 (Thiamine Hydrochloride)	10 mg.
Vitamin B_2 (G) (Riboflavin)	10 mg.
Nicotinamide (Niacinamide)	10 mg.
Pantothenic Acid (as Sodium Salt)	3 mg.

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Vitamin B_2 (G) (Riboflavin)	1 mg.
Vitamin B_6 (Pyridoxine Hydrochloride)	0.5 mg.
Nicotinamide (Niacinamide)	5 mg.
Pantothenic Acid (as the Sodium Salt)	2 mg.
Alcohol, 10%	

DOSAGE: Dogs—1 to 2 teaspoonsful before feeding or mixed with the food. Cats—One-half to 1 teaspoonful mixed with the food.

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[1] *Personal communication.*

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KOAGAMIN®

(aqueous solution of oxalic and malonic acids) to control internal and external bleeding

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HEALTH and NUTRITION go hand in hand

speed tissue repair

in **wounds** *(especially slow healing)*
burns • ulcers *(external)*
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with simple, safe, effective

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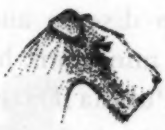

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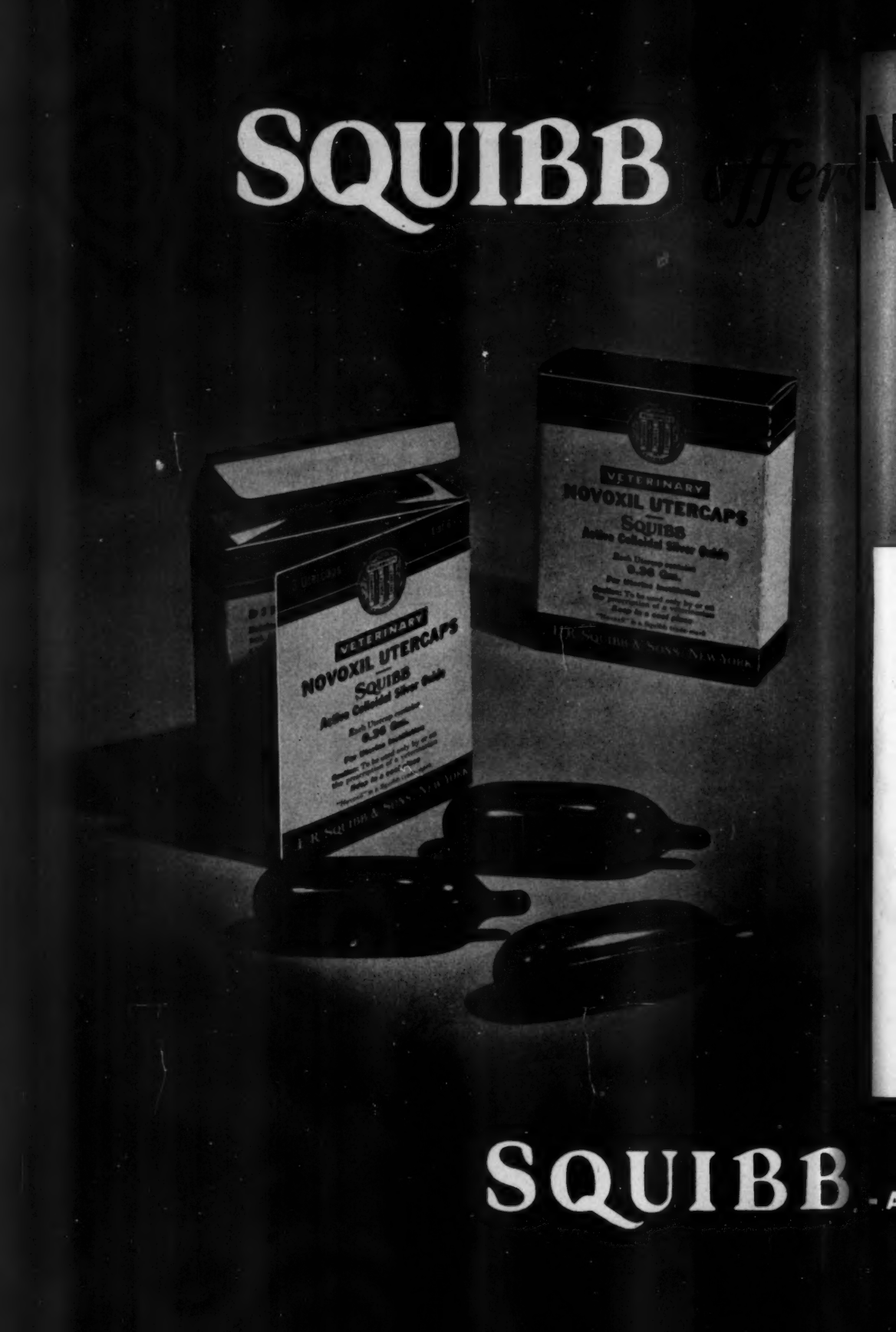

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...for the treatment of retained placenta, metritis and pyometra

Description:	An elongated gelatin capsule containing approximately 0.36 grams of active colloidal silver oxide.
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Advantages:	Easy to insert. Extremely effective. Economical. Nontoxic. Stable.
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1. Fittipaldi, S. A. and DeCamp, D., Vet. Med., November 1950.
2. Ibid.

Tablet containing:
Physostigmine Salicylate 0.5 mg (1/120 gr.)
Atropine Sulfate 0.15 mg (1/400 gr.)

Sterile, isotonic solution containing:
Physostigmine Salicylate 1.0 mg per cc.
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SUPPLIED:
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OIL or AQUEOUS SUSPENSION

Which is better in veterinary practice?

In a controversy, an old proverb says that "a single fact is worth a boatload of argument." Penicillin in oil, in treating animal diseases is better than penicillin in aqueous suspension. The advantage rests on a fact.

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Oil suspension gives considerably longer-lasting blood levels of penicillin, so that one injection of the proper dosage will maintain satisfactory blood levels for two or three days instead of just one day. It is true that aqueous suspension gives a quicker higher blood level of penicillin, but not significantly so.

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The longer blood levels from oil penicillin mean that you don't have to handle and inject animals for re-treatment so often. You may thus avoid much of the setback from unnecessarily frequent restraint, particularly in semi-wild stock or any range animals.

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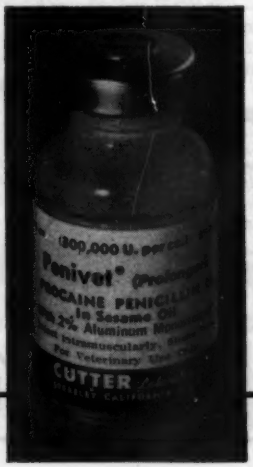
Cutter Laboratories has made Penivet available in oil suspension and in aqueous suspension because of the wide demand for this veterinary procaine penicillin G. But the standing recommendation is that Penivet in Oil should be used whenever penicillin is needed in treating cattle and sheep. Penivet in Oil is available in 10 cc. vials of one million units or 3 million units. Penivet Aqueous is available in a 10 cc. vial of 3 million units. You can buy your supply of Penivet from your authorized Cutter supplier. Send for free booklet, "Penicillin in Veterinary Use", and a dosage and disease chart on a handy blotter. Cutter Laboratories, Berkeley, California.



Penivet is available in oil or aqueous suspension, but Penivet in oil is recommended for treating the common diseases of cattle and sheep.

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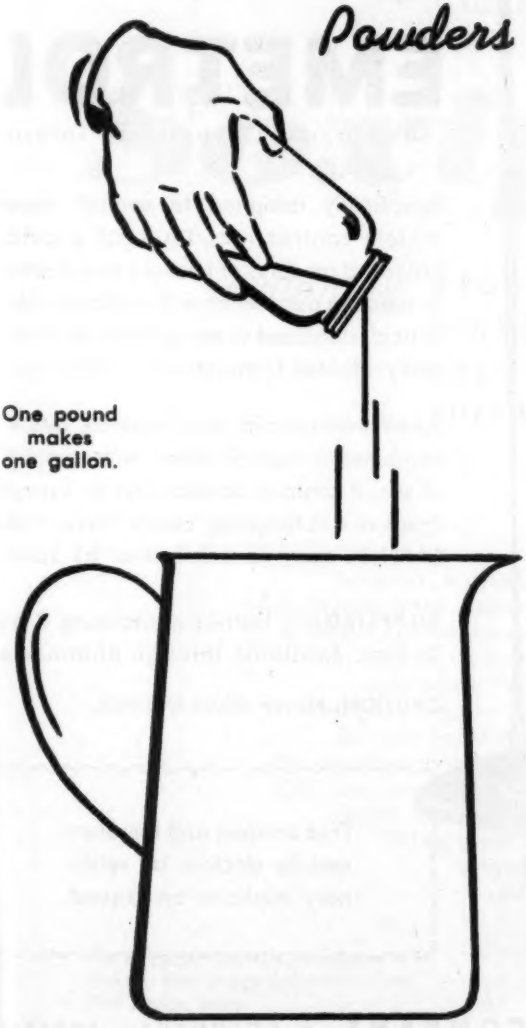

One pound makes one gallon.

Expectorants to assist in loosening accumulation of mucus in the upper respiratory tract of swine and other animals.

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PHOSPHORATED CARBOHYDRATE SOLUTION

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... for a more effective attack against mastitis

Soxipent

combining **PROCAINE PENICILLIN G**
DIHYDROSTREPTOMYCIN
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SULFATHIAZOLE ...*in oil*

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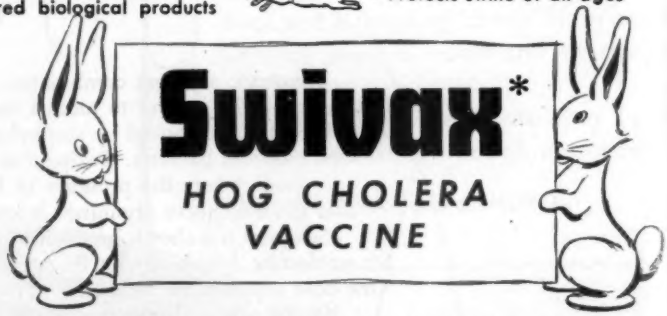
- Cannot infect the premises with hog-cholera
- Cannot introduce other diseases to swine
- Protects swine of all ages



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WANTED: Veterinarian for permanent position in mixed practice, in large Texas city. Give full particulars and salary expected in first letter. Address No. 75 care VETERINARY MEDICINE.

WANTED: Veterinarian for night work in Missouri small animal hospital. Can sleep most of night. Days free. $200. monthly. Give background. Address No. 76 care VETERINARY MEDICINE.

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WANTED VETERINARIAN: Basic producer of feed fortification products seeks veterinarian interested in specializing in nutrition. Prefer man with large animal experience. Position involves developing new feed formulas, formula counseling work and "trouble shooting" for feed manufacturers. Will work in close conjunction with sales department, which will involve considerable customer contact both in person and by correspondence. Public speaking ability will be an asset. Previous experience in nutrition is not a requisite, as we will provide intensive training in this field. This is a splendid position in the Chicago headquarters of an old established company doing an international business. It offers a secure future with plenty of opportunity for progress. Write fully of your training and experience. Your confidence will be respected. Address No. 89 care VETERINARY MEDICINE.

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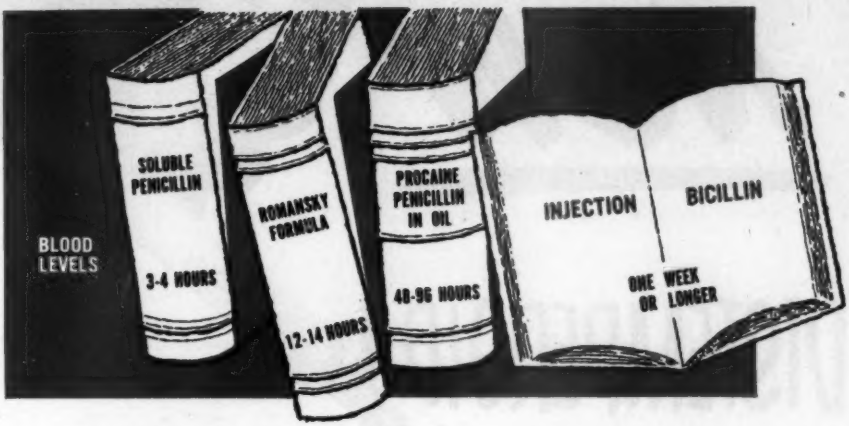

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antibiotics news and notes

Current Developments in the Field of Veterinary Antibiotic Therapy

Prepared for veterinarians by the Pfizer Veterinary Department, Antibiotic Division
Chas. Pfizer & Co., Inc., Brooklyn 6, N. Y.

Vol. I, No. 2 September, 1952

SHIPPING FEVER IN CATTLE

As winter progresses, a Connecticut veterinarian has found that cattle with shipping fever pneumonia respond less and less readily to sulfonamides, probably, he feels, because of treatment at the point of origin which resulted [illegible] the subsequent building up of sulfonamide-resistant organisms. Strep
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10% Staphylococcus albus and aureus (5% of each)

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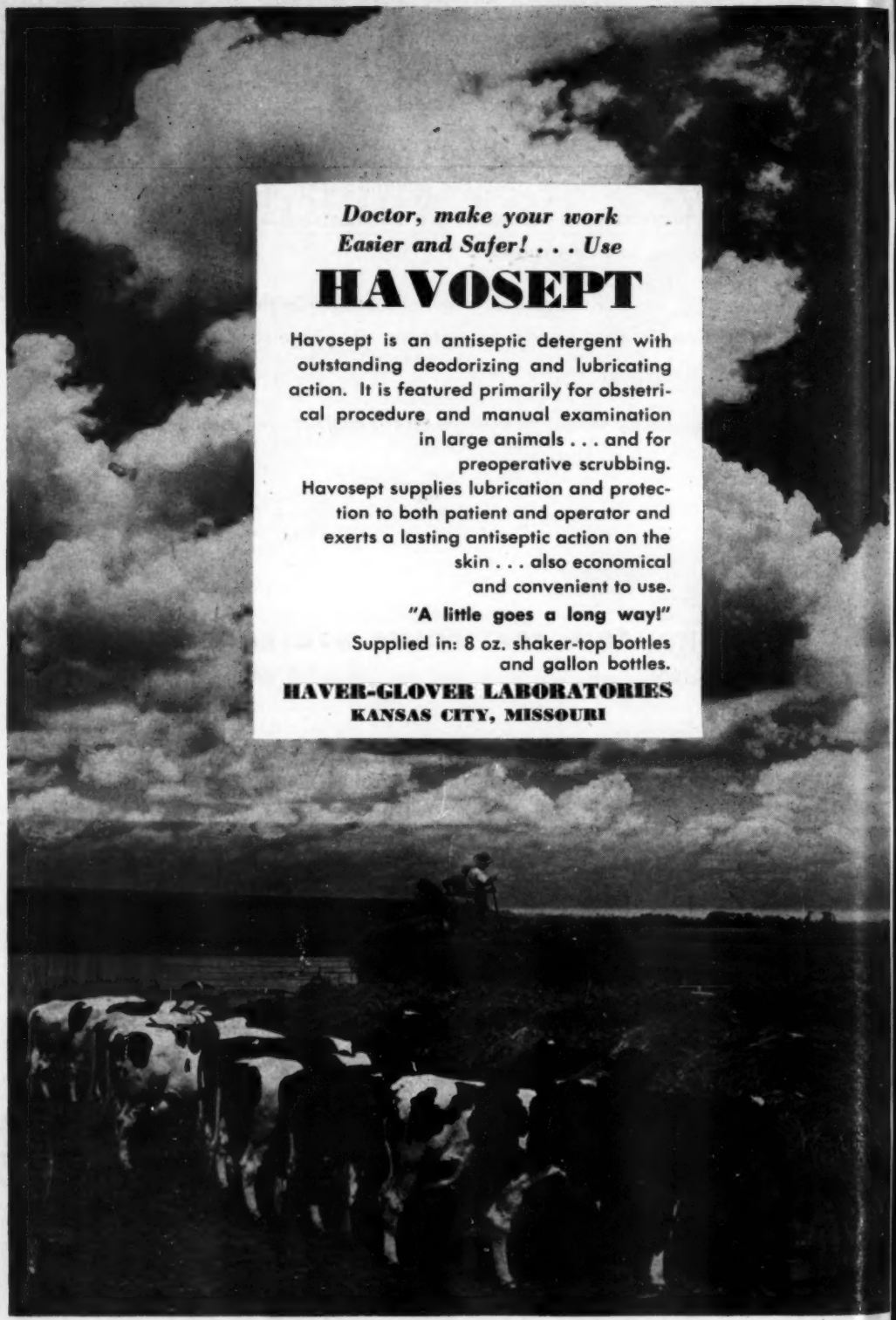
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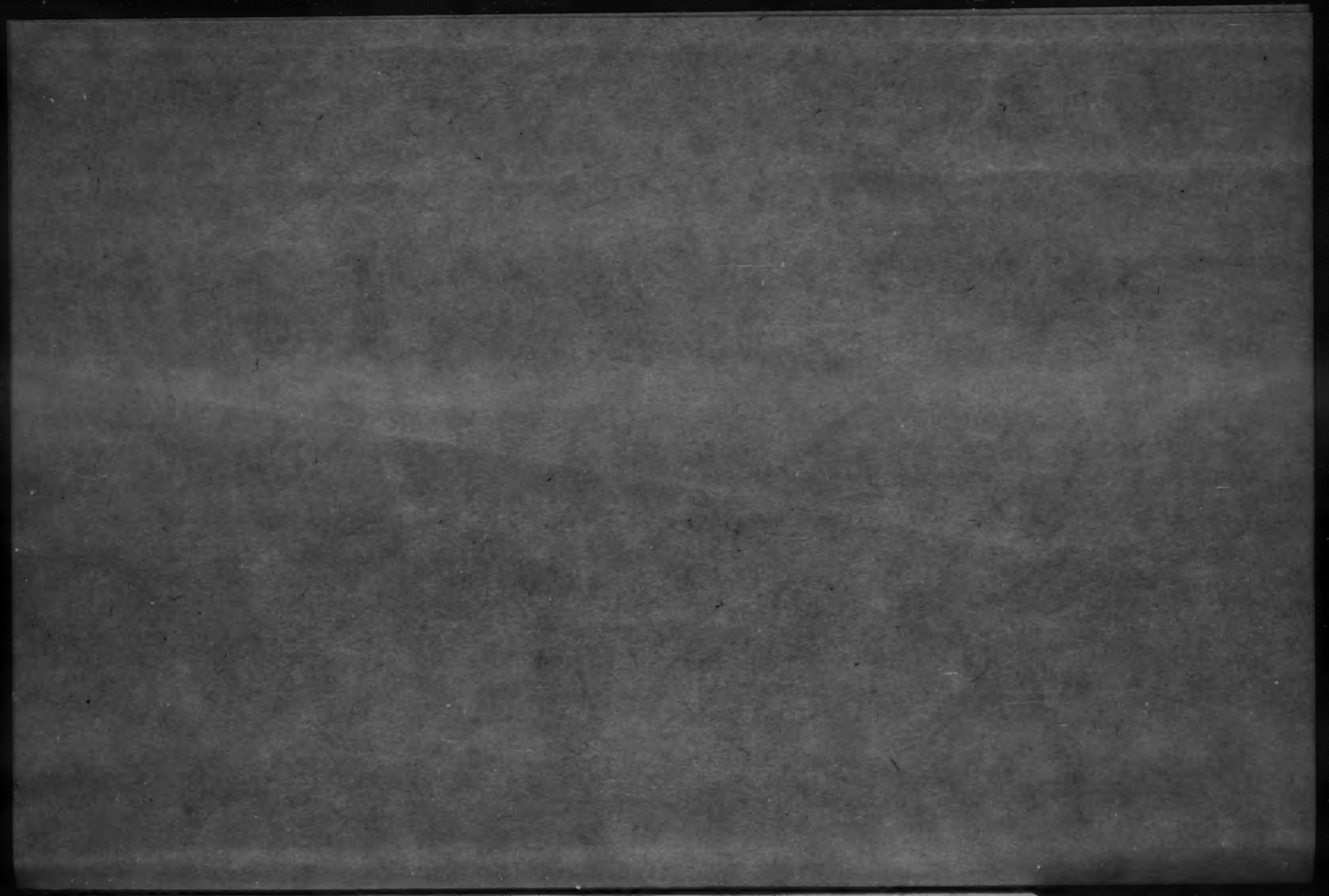
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